THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Inquiries received from a foreign government which expects to build a number of battleships have aroused much interest in the East and several shipbuilding concerns are figuring on submitting bids. There is, however some doubt as to whether these inquiries will result in orders, and, if they be excepted, there has been no noteworthy new business in finished materials. The awarding of the contract for armor plate by Secretary Morton to the Bethlehem and Carnegie companies indicates that the government is not yet fully satisfied that the Midvale Steel Co.'s plant is adequate to give deliveries on additional tonnage in the time required.

Specifications for finished material, with the exception of a few lines, are crowding the mills to the limit of their capacity, and shipments are gradually falling further behind. The absence of new business causes no alarm, as consumers are principally concerned in the delivery of material already purchased, and a general revival of buying can hardly be expected until these specifications are filled. Production of iron and steel continues at a record pace, and that mills should fall behind in their deliveries under such conditions indicates the tremendous specified tonnage they are carrying on their books. In nearly all finished lines deliveries cannot be made in less than a month, while of sizes on which pressure is greatest, shipments are deferred from two to three months.

The purchase of 25,000 tons of Bessemer iron at $15.50, Valley furnace, for February delivery by the Steel Corporation, is by far the most important pig iron transaction of the week. The associated merchant furnaces of the Valleys received 15,000 tons and receded from their holding price of $16, which lost them the Steel Corporation's January requirements. An outside furnace interest received the remaining tonnage. The iron is for distribution among the works of the Carnegie Steel Co., whose furnace capacity is inadequate to meet steel plant requirements.

Recent purchases of iron by independent steel makers have eliminated them as factors in the pig iron situation for the near future at least, and foundries continue apathetic. Offers of resale foundry iron in the Central West at concessions from the prevailing prices, by foundries that overbought during October and November, and the continued offerings of speculative iron, have been disturbing factors of the pig iron situation during the week. Some of this resale iron has been offered a little below $16, furnace, for No. 2, while speculative Bessemer is freely offered at $15.50. An investigation made by sales agencies in the Central West developed that users of foundry iron have covered their requirements for the next four or five months to such an extent that, unless there should be a decided improvement in demand for castings, orders for that period will not be large. Shipments of pig iron are being made rapidly, but there is some doubt as to whether the willingness of the buyers to accept the iron is due to present needs or is merely taken because the price is below present quotations and will be held for future needs. Southern iron is slightly easier and few furnaces in that section now decline orders at $13.50 Birmingham for No. 2.

An interesting development in the trade is the effort now being made by one of the leading steel interests to eliminate the scrap dealer to a large extent by incorporating in its new sliding scale billet contracts a clause compelling the sale of all the billet purchaser's melting scrap to the seller. The price to be paid for the scrap is to be equal to the selling price of Bessemer iron at Pittsburg. The increased demand for melting stock, due to the tremendous extension of the open-hearth practice, is the reason for the mill's precautionary measure to protect a future supply of this material.

Premiums of $4 a ton are now asked on billets for prompt delivery, and on sliding scale contracts, on account of the present price of Bessemer iron, consumers are compelled to pay $2 above the pool quotation. The advance in wire products of $1 a ton restores the price of wire nails prevailing before the radical reduction made last summer, previous advances in November and December amounting to $3. Plain wire is still $1 lower, and barbed $3. Transactions in heavy melting stock continue. Pittsburg reporting a sale of 5,000 tons at $16.75.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Feb. 8.

The iron and steel market, in both finished and unfinished lines, continues quiet so far as new business is concerned, but the mills report heavy specifications on contracts and urgent demands for immediate deliveries. In practically all finished lines the mills are behind on deliveries from a month to six weeks and in a few exceptions shipments cannot be promised for three months. Heavy buyers of finished material are not placing new orders, being concerned only in the delivery of material already purchased, but with the advent of milder weather a heavy buying movement is anticipated, and that the market has been sustained so well during this unseasonable period augurs well for the future of the trade.

The United States Steel Corporation has purchased 25,000 tons of Bessemer for February delivery to be consigned to its Carnegie works. The price was $15.50, Valley furnaces. Some resale foundry iron is now offered in this market by foundries that overbought during October and November and this has had a tendency to weaken the foundry iron market. Foundries generally are disinterested in new purchases, but as most of the furnaces have a comfortable tonnage ahead, they are not forcing their product and the market is being fairly well sustained. By the end of this week the Carnegie Steel Co. will have in operation 98 percent of its furnace capacity. The only idle stack for which no date of resumption has been set is the one at Zanesville, and it is doubtful whether it will again be operated. All of the company's steel plants, with the exception of the Columbus works, are also in operation,

and despite this tremendous production, shipments are falling behind.

An advance in wire products of $1 a ton went into effect on Feb. 1. Steel skelp is about $1 a ton higher and bar iron is firmly maintained at 1.70c Pittsburg, despite the efforts of the steel car manufacturers to break this price. None of the steel car plants in this district have covered on iron bars on the large car orders they have in hand and heavy buying in this line is anticipated shortly.

None of the independent finishing mills are securing an adequate supply of billets and the premium for prompt material in small lots is now $4 a ton. Heavy melting stock continues in big demand, one of the large independent steel interests having purchased 5,000 tons this week at $16.75, delivered at the mill.

Pig Iron.—The Carnegie Steel Co. now has its idle Isabella stack in operation and the second Donora furnace is expected in this week. The North Sharon furnace is also expected to resume before the end of the week and with these furnaces in operation the company will have only one of its 51 furnaces non-operative. The idle stack is located at Zanesville, O., and it is doubtful whether this furnace will ever be operated again. With these furnaces in operation the Carnegie Steel Co. will have 98 percent of its furnace capacity in. Some resale foundry iron is offered in this market by foundries that overbought during October and November and has disturbed the foundry iron market to some extent. Bessemer is held at $15.50 to $16, furnace, and No. 2 foundry at $16 to $16.25. Forge iron is held at $16 to $16.10, Pittsburg, while Southern producers are willing to accept $13.50, Birmingham, for No. 2. We revise quotations as follows:

Bessemer, Valley	$15 50 to 16 00
Bessemer, Pittsburg	16 35 to 16 85
No. 1 Foundry	17 25 to 17 50
No. 2 Foundry	16 85 to 17 35
Gray Forge, Pittsburg	16 00 to 16 25
Basic, Valley	15 75 to 16 00
Basic, Pittsburg	16 60 to 16 85

Steel.—This week the Donora plant of the Carnegie Steel Co. was placed in operation, six of the furnaces having been fired. Although completed for more than a year, this is the first time this plant has been operated. The Carnegie Steel Co. now has only one idle steel plant and that is located at Columbus. Bessemer and open-hearth billets for prompt delivery in small lots are held at $25, f. o. b. mill, Pittsburg, while sheet bars are held at an advance of $2. Bessemer and open-hearth rods are held at $31 to $31.50, Pittsburg.

Ferro-Manganese.—Domestic ferro, 80 percent, is held at $46 a ton, delivered in carload lots at buyer's mill, delivered at any point east of the Mississippi.

Muck Bar.—There have been no sales of muck iron and the market is nominally $28.50 to $29, Pittsburg.

Skelp.—Steel skelp mills are now behind on their shipments from a month to six weeks and slight premiums are offered for material for prompt delivery. Steel skelp has been advanced $1 a ton, grooved now being held at 1.55c, and sheared at 1.65c. Grooved iron is held at 1.80c to 1.85c, and sheared at 1.90c to 1.95c.

Rails and Track Material.—Light rails are easier and lower prices are being quoted. On standard sections the total tonnage up to date is estimated at 1,000,000 tons, and while the business thus far placed with the rail makers is not entirely satisfactory, it is believed that there will be no hitch in the placing of orders in the next few months. We revise quotations as follows: Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 lb., $26 to $26.50; 20 lb., $24.50 to $25; 25 to 45 lb., $22.50 to $23. Angle bars, 1.25c; spikes, 1.85c to 1.90c.

Plates.—Plate mills are gradually falling behind on deliveries on account of the heavy specifications of the steel car works. Other lines are also increasing their plate orders and the plate situation generally is very much improved. We make the following quotations: Tank plates, 1¼ in. thick, 6¼ to 14 in., inclusive, 1.40c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.50c. Extras are as follows per lb.: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive firebox, 50c; plates over 100 in. up to 110 in. in width, not less than 5c per 100 lb. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates, 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

Bars.—Specifications on steel bars are heavier than they have been at any time in the past year. On iron bars 1.70c Pittsburg continues to be firmly maintained. Steel car plants in this district have covered iron bar requirements on only a small number of cars on their books and heavy buying from this source is anticipated in the near future. We quote: Bar iron, 1.65c to 1.69¼c Pittsburg; hoops, 1.55c, and bands, 1.40c, both taking bar extras. Bessemer steel bars, 1.40c; open-hearth steel bars, 1.40c; plow and cultivator beams, 1.40c, net; channels, angles, zees and tees, under 3 in., 1.05c. The following differentials are maintained on steel: Less than 2,000 lb. of a size and not less than 1,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Sheets.—Demand for sheets continues heavy and jobbers are laying in heavy stocks. In a few instances slight premiums have been paid for prompt shipment but most of the business is being done at prevailing prices. We quote black sheets in 500-bundle lots and over at follows: No. 30, 2.70c; No. 29, 2.60c; No. 28, 2.30c; No. 27, 2.20c; Nos. 25-26, 2.15c; Nos. 23-24, 2.10c; Nos. 18-20, 2.05c; No. 16, 2c; Nos. 12-14, 1.95c; No. 9, 1.90c; No. 8, 1.85c. Galvanized: No. 30, 4.25c; No. 29, 3.75c; No. 28, 3.35c; No. 27, 3.15c; Nos. 25-26, 2.95c; Nos. 23-24, 2.75c; Nos. 18-20, 2.60c; No. 16, 2.45c.

Wire and Wire Nails.—On Feb. 1 wire nails and wire products were advanced $1 a ton. This advance restores the prices on nails prevailing before the radical cut made on Aug. 17, while plain wire is $1 lower and barbed $3 lower. We revise quotations as follows: Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 to jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30 cents for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron cut nails are held at $1.85 Pittsburg, and steel at $1.75.

Pipes and Tubes.—Specifications continue heavy on tube contracts and the market in both merchant pipe and boiler tubing is on a very firm basis. Shipping instructions generally are for prompt delivery, indicating that stocks are very low. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	68	52	66	50
⅜ to 6 inches	76	66	74½	64½
⅜ and ½ inch	72	60	70	58
7 to 12 inches	71	56	69½	54
Extra Strong Plain Ends.				
⅛ to ¾ inch	61	49	59	47
½ to 4 inches	68	56	66	54
4½ to 8 inches	64	52	62	50
Double extra strong plain ends, ½ to 8 inches	57½	46½	55½	44½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron.
1 to 1½ inches	46	43
1¾ to 2½ inches	58	43
2½ inches	60	48
2¾ to 5 inches	66	55
6 to 13 inches	58	43

Less than carloads 2 points less.

Merchant Steel.—Demand continues heavy in all lines and prices continue to be firmly maintained. We quote as follows: Cold rolled and ground shafting, 52 percent off in carload lots, and 47 off in less than car lots, delivered in base territory; tire steel, 1.60c to 1.65c; open-hearth spring steel, 2c to 2.10c; sleigh shoe, flat, 1.55c to 1.60c; smooth finished machinery steel, 1.60c; toe calk, 1.95c to 2c.

Structural Material.—New business has been light, but the large number of new projects promise a heavy tonnage for the structural mills this year. Quotations are unchanged as follows: Beams and channels up to 15 in., 1.50c; over 15 in., 1.60c; angles, 3 x 2 up to 6 x 6, 1.50c; zees, 1.40c; tees, 1.55c; angles from 3 to 16 in., 1.50c; universal and sheared plates, 6¼ to 14 in., inclusive, 1.40c; over 14 in., 1.50c base.

Old Material.—We note the sale of 5,000 tons of heavy melting stock to one of the large independent steel interests at $16.75, delivered at mill. The determination of one of the leading steel interests to take scrap on all steel contracts calling for billets on a sliding scale will take a large amount of scrap from the open market. Demand for old material generally is not heavy and in a few lines the market is somewhat weaker. We make the following quotations, gross tons: Heavy melting stock, $16.25 to $16.75; low phosphorus, $19.50 to $20; rerolling rails, $16.50 to $17; sheet scrap, $15 to $15.25; No. 1 wrought, $19.50 to $20; cast iron borings, $11 to $11.50.

Coke.—Owing to the scarcity of cars coke operators in the Connellsville region have accumulated about 200,000 tons of coke. It is doubtful, however, whether this large accumulation will result in the shutting down of any of the plants, as the railroads promise better shipments as soon as the weather becomes milder. On foundry coke the market is somewhat easier and is held at $2.75 to $3. Furnace coke is held at $2.50 to $2.60. During the week ending Jan. 28, the production of the upper region amounted to 266,436 tons, and the lower region produced 74,879 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Feb. 7.

In its outward aspect, the local market presents a very strong appearance. Producers of metal products are in an excellent condition, both as regards the business on their books and the tonnage under negotiation. Despite the dullness that has prevailed and which continues in a lesser degree than formerly, there is no feeling of weakness anywhere. Prices are very strong, specifications voluminous, and the inquiry for new business is steadily improving. All the symptoms point to a year of great activity as soon as the cold weather has passed and outdoor operations have commenced, and sellers are very sanguine as to the future. The cruder metals which were the most affected in the recent lull have acquired increased strength as a result of the better inquiry since the first of the week, and there is now no uncertainty as to the maintenance of present schedules. The advances of $1 a ton on wire products and merchant pipes, which went into effect last week, have strengthened the situation on finished steel, as well as greatly improving the demand for both materials. Galvanized sheets are said to be the next product in line for an advance, present prices based on 3.15c Pittsburg for No. 27 gauge, being out of proportion with the cost of sheet bars and spelter. There is an active demand for billets and wire rods, and though attractive premiums are offered, mills in this district are wholly unable to satisfy the wants of prospective buyers. The trading in heavy rails has been light in the week under review, the only noteworthy contract placed with the local interest being one for 13,000 tons. Several smaller orders were closed, but the aggregate tonnage was not of large proportions. The Illinois Steel Co. is now comfortably fixed in the matter of rail business, having contracts on its books for approximately 500,000 tons.

Specifications for plates continue brisk and western makers are said to be about four weeks behind in their shipments. Structural steel for bridge and car construction is in good demand, though the local building interests are doing little in the way of new work. Bar iron is quiet, but is held firmly at 1.65c Chicago. Scrap appears to be on the verge of a general slump in prices, several products already having suffered drastic cuts.

Pig Iron.—Since Monday last, the inquiry for iron has been heavier than for several weeks, ranging in lots from 5,000 tons downwards; and the indications now point to the passing of the depression that has been felt since the first of the year. Although few of these inquiries, except the smaller ones, have been negotiated, the tonnage that has come into the market is of large enough proportions to suggest that better days are at hand. Many of the contracts that were made in the closing months of 1904 will expire this month, and, while not over optimistic as to the situation, sellers look for a better trade from now on. One of the great obstacles to any active movement has been and still is the wide difference of opinion which exists between buyers and sellers in their ideas as to future prices. Makers of Southern iron confidently expect that the market will before long go to $15 Birmingham for No. 2 Foundry, while melters are as strongly of the opinion that quotations will drop to $12 Birmingham. Both sides have been quietly waiting for developments, but as yet no appreciable change one way or the other has been made. Northern irons are quoted at $17.50 Chicago for No. 2. There is a fair demand for the local product, though the business is of a scattering nature and from widely different sources. The malleable trade continues quiet. Our quotations follow:

Lake Superior Charcoal	$18 50 to 19 00
Northern Foundry No. 1	18 00
Northern Foundry No. 2	17 50
Northern Foundry No. 3	17 00
Northern Scotch Foundry	18 50
Ohio Strong Softeners No. 1	19 30 to 19 80
Ohio Strong Softeners No. 2	18 30 to 18 80
Southern Foundry No. 1	17 65 to 18 15
Southern Foundry No. 2	17 15 to 17 65
Southern Foundry No. 3	16 65 to 17 15
Southern Foundry No. 4	16 40 to 16 90
Southern No. 1 Soft	17 65 to 18 15
Southern No. 2 Soft	17 15 to 17 90
Southern Gray Forge	16 40
Southern Mottled	16 40
Southern Silveries (4% to 6% Silicon)	18 65 to 19 15
Jackson Co. Silverics (6% to 8% Silicon)	21 30 to 22 30
Jackson Co. Silveries (8% to 10% Silicon)	23 30 to 24 30
Alabama and Georgia Car Wheel	21 15
Malleable Bessemer	17 50
Basic Iron	17 65 to 18 15

Billets.—The demand for forging billets continues active and some difficulty is felt by buyers in getting their full requirements filled. Rolling billets are very scarce, and it is well nigh impossible to find a mill willing to accept further business. All orders command a premium, differing according to the tonnage involved and the relations between the buyer and seller. We quote forging billets, 4 x 4 and larger, up to but not including 10 x 10, up to .25 carbon, $28; up to and including .60 carbon, $1 extra. Rerolling billets, Bessemer or open hearth, 4 x 4 and larger, $26; billets, 3⅞ in. and smaller and sheet and tin bars, $28. Wire rods are very scarce in this market and the local manufacturer was compelled to decline an order for 1,000 tons a few days ago. This product is firm at $33 Pittsburg.

Bars.—There is little of interest to chronicle regarding either iron or steel bars. Most all the large western consumers of these products are under contract, and new business, is, therefore, not of large proportions. Specifications are in ample volume and sufficient to keep western mills running to full capacity. All prices are firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Bar iron, 1.65c; Bessemer and open-hearth bars and bands, 1.56½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hard steel angles, 1.60c to 1.65c; hoops, 1.71½c base, full extras. Store quotations are firm, and we quote on lots from warehouse stocks, as follows: Bar iron, 1.90c to 2c base, full extras; soft steel bars and bands, 1.75c to 1.85c base, full extras; soft steel angles, channels and tees, 1.85c to 1.95c; hoops, 2c to 2.10c base, full extras.

Sheets.—A better inquiry has sprung up in the last week for both black and galvanized sheets, and the indications point to a general buying movement of summer and fall stocks. Mills, however, are declining to take on much new tonnage at present prices, and there is considerable talk of an advance in both products, but especially in galvanized sheets, at an early date. As yet, however, prices are without change, and we continue to quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 to 10, 1.81½c to 1.86½c; Nos. 11 and 12, 1.86½c to 1.91½c; Nos. 13 and 14, 1.91½c to 1.96½c; Nos. 15 and 16, 2.01½c to 2.06½c. On box annealed, one pass, cold rolled, we quote Nos. 18 and 20, 2.21½c to 2.26½c; Nos. 22 and 24, 2.26½c to 2.31½; Nos. 25 and 26, 2.31½ to 2.36½c; No. 27, 2.36½c to 2.41½c; No. 28, 2.46½c to 2.51½c; No. 29, 2.56½c to 2.61½c; No. 30, 2.66½c to 2.71½c. We quote on lots from warehouse stocks as follows: No. 10, 2c to 2.05c; No. 12, 2.05c to 2.10c; No. 14, 2.10c to 2.15c; No. 16, 2.20c to 2.25c; Nos. 18 and 20, 2.40c to 2.45c; Nos. 22 and 24, 2.45c to 2.50c; No. 26, 2.60c to 2.65c; No 27, 2.70c to 2.75c; No. 28, 2.80c to 2.85c; No. 29, 2.90c to 2.95c. Galvanized sheets, mill shipments, Chicago delivery, are quoted without change as follows: Nos. 12-14, 2.46½c; No. 16, 2.61½c; Nos. 18-21, 2.76½c; Nos. 22-24, 2.91½c; No. 26, 3.11½c; No. 27, 3.31½c; No. 28, 3.51½c; No. 29, 3.76½c. Jobbers' prices on lots from store are as follows: Nos. 10 to 16 inclusive, 3c; Nos. 18 and 20, 3.01c; Nos. 22 and 24, 3.15c to 3.20c; No. 26, 3.38c to 3.40c; No. 27, 3.60c; No. 28, 3.83c; No. 29, 4.20c to 4.25c; No. 30, 4.73c.

Structural Material.—Railroads are specifying freely for material to enter into bridge and car construction, but aside from this business, there is little call for shapes. As we have previously called attention to before, however, the prospects are that Chicago will consume a larger tonnage of structural steel in the coming spring and summer than in any year in its history. A great many large projects are under consideration, involving several large office buildings and warehouses, work on which will be commenced as soon as the weather moderates. Prices are without change, and we quote on carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in. inclusive, 1.66½c; angles, 3 to 6 in., ¼ in. and heavier, 1.66½c; angles larger than 6 in. on one or both legs, 1.76½c; beams larger than 15 in. 1.76½c; zees, 3 in. and over, 1.66½c; tees, 3 in. and over, 1.76½c, with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. Store prices have been advanced, and, according to tonnage, are quoted: 1.90c to 2c for angles, beams and channels, base sizes, with 2c to 2.10c for 18, 20 and 24-in. beams; tees and zees, 1.95c to 2.05c. These prices are for either random lengths or cut to specifications.

Plates.—No cessation is to be noted in the heavy volume of specifications, and western mills are getting behind in their deliveries. The local concern has sold its capacity for practically the next ten months, and is not very desirous of booking additional tonnage. Prices are unchanged, and we quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6¼ in. to 14 in. wide, rectangular plates only, 1.56½c base; over 14 in., to 100 in., 1.66½c base, flange steel, 1.76½c base; marine steel, 1.86½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store prices are very firm. We have revised our quotations as follows: Tank steel, ¼ in. and heavier up to and including 72 in. wide, 1.90c; over 72 in. wide up to 100 in., 1.10c extra; over 100 in. wide, usual mill extras; 3-16 in. up to but not including 72 in. wide, 2c; 3-16 in., 72 in. wide, 2¼c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—The demand for heavy rails has fallen off somewhat in the week under review, the only contract of importance closed during this period being one for 13,000 tons for a southwestern road. Light rails and track supplies are firm and in brisk demand. We quote heavy sections in 500-ton lots and over, f. o. b. bill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $27; 16-lb., $26; 20 and 25-lb., $25; 30, 35, 40 and 45-lb. sections, $24, all f. o. b. Milwaukee mill. Track supplies, f. o. b. Joliet mill: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.75c; track bolts, 3½ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts 2.55c to 2.65c.

Merchant Steel.—Aside from stating that specifications continue in volume sufficient to keep mills running to full capacity, there is nothing to report regarding the products listed below. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.61½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.81½c; smooth finished tire, 1.76½c; plow steel, 2.20c and upwards, according to quality; toe calk steel, 2.11½c. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and upwards. Cold rolled shafting is quoted at 52 percent from list on carload lots, and 47 percent discount on less than carload lots.

Merchant Pipe.—A new schedule of prices went into effect February 1st, amounting to an advance of $1 a ton in all sizes. The demand continues of excellent proportions. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¼ inches	66.35	50.35	64.35	48.35
⅜ to ½ inches	70.35	58.35	68.35	56.35
¾ to 6 inches	74.35	64.35	72.85	62.85
7 to 12 inches	69.35	54.35	67.85	52.35
EXTRA STRONG PIPE.				
⅛ to ⅜ inches	59.35	47.35	57.35	45.35
½ to 4 inches	66.35	54.35	64.35	52.35
4½ to 8 inches	62.35	50.35	60.35	48.35
DOUBLE EXTRA STRONG PIPE.				
½ to 8 inches	55.35	44.35	53.35	42.35

Boiler Tubes.—The demand for boiler tubes while nominally good has nothing in it to warrant a very optimistic report. Prices are firm, and we quote as follows:

BOILER TUBES.

	Steel.	Iron.	Seamless.
1 to 1½ inches	42.35	39.35	52.35
1¾ to 2¼ inches	54.35	39.35	40.35
2½ inches	56.35	44.35	43.35
2¾ to 5 inches	62.35	51.35	Up to 4 inches. 50.85
6 to 13 inches	54.35	39.35	.....

There is no agreement on store prices and discounts of various jobbers differ from ½ to 1½ percent. A fair average of prices on small lots from store is as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1¼ inches, inclusive	40½	37½	40
1¾ to 2¼ inches, inclusive	50½	35	37½
2½ inches, inclusive	53	37½	40
2¾ to 5 inches, inclusive	60¼	47½	47½
6 inches and larger	50½	35	

Cast Iron Pipe.—The unseasonable weather which has prevailed for the last ten days has not been conducive to the buying of pipe. The bulk of the business coming forward is made up of small tonnage, the only order of importance closed in the week under review being one for 800 tons from St. Paul, Minn. Prices are without change, and we quote carload lots, Chicago delivery, as follows: 4-in. water pipe, $28.50; 6-in. and larger, $27.50; gas pipe, $1 a ton higher.

Wire Products.—As has been expected for some time, the leading interest advanced its prices February 2 $1 a ton. Demand continues of excellent proportions, as formerly, producers limiting buyers in their orders to 60 day deliveries. We have revised our prices, and quote carload lots to jobbers, mill shipments, Chicago delivery, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.05; galvanized staples, $2.35. Less than carload lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload

lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent to 85 percent discount f. o. b., Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 lb.

Foundry Coke.—It is expected that before the week is out there will be a greatly improved demand for coke as a result of the tie-up in traffic that will follow the heavy snow storm that has prevailed all over the central west. The traffic conditions have been bad enough in this city during the recent cold snap, but are expected to be a great deal worse for several days to come. Prices are firm on the basis of $3 at Connellsville for 72-hour foundry grade or $5.65 Chicago in car lots. Less popular brands of Virginia and West Virginia cokes are selling at from $2.50 to $2.75 at the ovens. Wise County Virginia coke at $3 at the ovens makes the going price here $5.25.

Old Material.—The scrap market is weaker than it has been for several weeks. There is little demand except for lots for "filling in" purposes. Many consumers, however, show a disposition to stock material providing the price is right, and if the seller is anxious to make a trade, he can easily do it at a price. The scrap market, however, is conspicuous by the lack of the insistent demand that has been felt for so long. Many dealers, feeling the necessity of ready money, are showing a disposition to unload part of their stocks, and are doing so at slight recessions from what are considered market prices. These trades make it difficult to report correct quotations, but the following prices have formed the basis of several sales within recent date. We quote dealers' selling prices, gross tons, as follows:

Old steel rails (4 feet and over)	$15 00 to 15 50
Old steel rails (less than 4 feet)	14 50 to 15 00
Old iron rails	22 00 to 22 50
Relaying rails, subject to inspection	22 00 to 22 50
Relaying rails, without inspection	20 00 to 20 50
Old wheels	16 50 to 17 00
Heavy melting steel	14 50 to 15 00
Mixed country steel	9 50 to 10 50
Low phosphorus scrap (.05 and under)	14 00 to 14 50

The following quotations are for net tons:

No. 1 R. R. wrought	17 00 to 17 50
No. 2 R. R. wrought	16 00 to 16 50
Shafting	17 00 to 17 50
Dealers' forge, No. 1	14 00 to 14 50
Wrought pipe and flues	13 00 to 13 50
No. 1 cast, 150 lb. and less	14 00 to 14 50
No. 1 mill	11 00 to 11 50
No. 1 Busheling	11 50 to 12 00
No. 2 Busheling	10 50 to 11 00
Country sheet	8 00 to 8 50
No. 1 boilers, cut	12 00 to 13 00
Boiler punchings	13 00 to 13 50
Iron car axles	21 50 to 22 50
Steel car axles	17 00 to 17 50
Iron axle turnings	11 50 to 12 00
Steel axle turnings	11 00 to 11 25
Cast borings	8 50 to 9 00
Mixed borings, etc	8 50 to 9 00
Machine shop turnings	11 00 to 11 50
Railroad malleable	14 00 to 14 50
Agricultural malleable	12 00 to 13 00
Stove plate and light cast scrap	11 00 to 11 50
Old iron splice bars	18 00 to 18 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, Feb. 8.

Iron Ore.—Sales continue in small lots, but on account of the heavy buying of a few weeks ago, there is not now much activity in the market. Labor is scarce on the ranges and for this reason some companies can not estimate with entire accuracy what their output will be. Some tentative efforts of shippers and vesselmen to agree on freight rates have failed.

Pig Iron.—While jobbing foundries have not yet struck business equal to that of the makers of steel and finished materials, carefully compiled statistics continue to show that Ohio furnaces, including those which sell largely to the foundry trade, are delivering more iron than they are making. It is true, however, that sales at present are small. The usual quotation is still $16 per No. 2. Inquiries for the second and third quarter are coming in satisfactorily. Southern iron is a small factor, with quotations $13.50 to $14, Birmingham, for No. 2. We quote as follows, Cleveland delivery:

Bessemer	$16 35 to 16 85
No. 1 Foundry	17 00 to 17 50
No. 2 Foundry	16 50 to 16 85
No. 3 Foundry	16 75 to 16 00
No. 2 Southern	17 35 to 17 85
Gray Forge	16 00 to 16 25
Gray Forge, Southern	15 85 to 16 35
Lake Superior charcoal	18 00 to 18 50

Finished Material.—Mills are falling farther behind in their deliveries, especially on plates and shapes, on which delivery by the principal producers is not promised in less than three months. The numerous orders for cars have so increased the demand for axles that some companies can not take orders for delivery before July or August. It is also difficult to get prompt shipment of steel bars, which sell at 1.49½c Cleveland. Bar iron is quoted at 1.65c at the mills, but the demand is light and lower prices are expected. They will undoubtedly be named if scrap declines as indicated by present conditions. Sheets are in good demand with prices unchanged. The prices of the principal producers through jobbers are as follows: Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.79½c; Nos. 11-12, 1.84½c; No. 14, 1.89½c; No. 16, 1.99½c; No. 27, 2.39¼c; No. 28, 2.40¼c. Galvanized, mill sales, No. 14, 2.54¼c; No. 16, 2.64½c; Nos. 18-20, 2.84½c; Nos. 22-24, 2.94½c; No. 25, 3.14½c; No. 27, 3.34½c; No. 28, 3.54¼c. Out of stock, black sheets, ¼ in., 1.80c; 3-16 in., 1.90c. Blue annealed, No. 10, 2.05c; No. 12, 2.10c; No 14, 2.15c; No. 16, 2.25c. One pass cold rolled: Nos. 18-20, 2.45c; Nos. 22-24, 2.50c; No. 26, 2.55c; No. 27, 2.60c; No. 28, 270c; No. 30, 3.10c. Galvanized out of stock, No. 16, 2.85c; Nos. 18-20, 2.95c; Nos. 22-24, 3.40c; No. 26, 3.30c; No. 27, 3.50c; No. 28, 3.70c; No. 30, 4.50c.

Old Material.—The market is dull and weak. While dealers are still stubbornly holding for recent prices, buyers refuse to place orders. Quotations are nominally the same, but a drop of from 75 cents to $1.25 from the following quotations will be necessary to bring out much business. We quote as follows, gross tons, Cleveland:

Old iron rails	$24 00 to 25 00
Old steel rails (over 6 feet)	16 50 to 17 00
Old steel rails (under 6 feet)	17 00 to 17 50
Old car wheels	17 50 to 18 00
Steel boiler plate	18 00 to 18 50
Steel axles	18 00 to 19 00
Malleable iron (railroad)	15 50 to 16 00
Malleable iron (agricultural)	14 50 to 15 00
Heavy steel	16 50 to 17 00

We quote as follows, net tons:

No. 1 R. R. wrought	17 00 to 17 50
No. 1 busheling	14 50 to 15 00
No. 1 machine cast	14 50 to 15 00
Iron axles	21 00 to 22 00
Axle turnings	18 00 to 18 50
Wrought turnings (free from cast)	12 00 to 12 50
Grate bars	10 00 to 10 50
Pipes and flues	13 00 to 14 00
Tank iron	11 00 to 12 00
Hoop and band iron	9 00 to 10 00
Sheet iron	7 00 to 8 00
Wrought drillings	12 00 to 12 50
Stove plate	11 00 to 11 50
Cast borings	8 50 to 9 00

CINCINNATI.

Feb. 7.

Coke.—The coke market continues quiet and foundry coke is now quoted at $3.00 f. o. b. ovens. Prompt shipment furnace coke is still in limited supply with quotations at $2.50 to $2.75 per ton f. o. b. ovens. Shipments are regarded as heavy.

Pig Iron.—The past week has been one of decided quietude in the pig iron market and no large inquiries have been submitted and no important transactions reported. The lack of demand for the past several weeks is developing an easier tone to prices and while $13.50 Birmingham for No. 2 Foundry is still minimum, there is less tendency to firm holding on the part of those furnaces which have been demanding $13.75. In fact, it seems fairly well established that but few of the southern furnaces would decline business now at $13.50 Birmingham. Sales agencies have been canvassing the market carefully with a view to ascertaining the condition of consum-

ers in regard to their supplies. The results of these investigations indicate that from 95 percent to 98 percent of the consumers in territory west of Pittsburg have covered their requirements for the first quarter of 1905. Of this number it is estimated that 90 percent have covered for the first four months; 80 percent for the first five months and 75 percent are covered to July 1. These figures are based on a present rate at which melters are using iron. Shipments are good and consumers are taking iron on their contracts readily. Some believe that this is an argument in favor of liberal melting. Others believe that consumers are willingly taking the deliveries because the contract price generally averages well below current quotations. It is also believed that the consumer who is taking iron in on contracts at prices running decidedly below present quotations is likely to refrain from placing new orders at the present level of values until forced to do so by actual necessity. This is the view of the situation that confronts the selling interests and under such a condition of affairs they seem to realize fully the futility of shading values and that such a course instead of inducing business would be likely to encourage consumers to defer placing orders. Minimum prices are therefore well maintained at $16.00 furnace in Ohio and $13.50 Birmingham. We make no change in quotations, which are as follows, f. o. b. Cincinnati:

Southern Foundry No. 1	$16 75 to 17 00
Southern Foundry No. 2	16 25 to 16 50
Southern Foundry No. 3	15 75 to 16 00
Southern Foundry No. 4	15 50 to 15 75
Southern Foundry No. 1, soft	16 75 to 17 00
Southern Foundry No. 2, soft	16 25 to 16 50
Gray Forge	15 25 to 15 50
Northern Foundry No. 1	17 65 to 18 15
Northern Foundry No. 2	17 15 to 17 65
Northern Foundry No. 3	16 65 to 17 15
Southern Charcoal	19 50 to 19 75

Finished Material.—The market is firm for all descriptions. Mills are well sold up and jobbers in structural, iron bars and steel bars report heavy demands upon their stocks. Bar iron is quoted at 1.75c; steel bars at 1.53c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 10 and 5 percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of stores at 1.90c for ¼-in. and 1.95c for 3-16 No. 8 and No. 10. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.95c to 2c for base sizes.

In merchant pipe the market is active and quotations advanced one-half point. Independent mills are quoting but little under the schedule of leading interests and the demand from stock is good. We quote car load lots f. o. b. Cincinnati as follows:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed. Wrought Iron Pipe.	
	Black.	Galv.	Black.	Galv.
	Percent.	Percent.	Percent.	Percent.
⅛ and ¼ inches	66.35	50.35	64.35	48.35
⅜ and ½ inches	70.35	58.35	68.35	56.35
¾ to 6 inches	74.35	64.35	77.85	62.85
7 to 12 inches	69.35	54.35	67.85	52.35

Old Material.—While prices are not quotably changed the market is easy and dull. The following prices represent sellers' quotations which, however, are shaded under firm offers. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$16 50 to 17 00
Cast machine and foundry, net tons	13 50 to 14 00
Old iron rails, gross tons	20 00 to 21 00
Old steel rails, gross tons	15 00 to 15 50
Old short lengths, gross tons	14 00 to 14 50
Old iron axles, net tons	19 00 to 20 00
Stove plate, net tons	9 50 to 10 00
Wrought turnings, net tons	12 50 to 13 00
Cast borings, net tons	9 00 to 9 50

PHILADELPHIA.

Feb. 7.

The most interesting development of the week was in the way of inquiries for a number of foreign battleships on which all the shipbuilders are figuring. General conditions indicate an unusually heavy demand during the spring and summer months for all kinds of material.

Pig Iron.—Business is rather quiet, but there are no signs of weakness. The furnace output is pretty well sold up for the next five or six months. Hence neither buyers nor sellers are very active. We quote as follows: No. 1 X foundry, $18 to $18.25; No. 2 X foundry, $17.50 to $17.75; No. 2 plain, $16.75 to $17; standard gray forge, $15.75 to $16; basic, $16.50 to $16.75; low phosphorus, $20 to $20.25.

Finished Material.—The market, while not as active as it has been, is firm. The mills are comfortably supplied with orders. We quote: Beams and channels up to 15 in., 1.63½c; over 15 in., 1.73½c; small angles, 1.63½c; large angles, 1.73½c; steel bars, 1.53½c to 1.63½c; refined iron, 1.65c to 1.70c; plates, 1.63½c.

Old Material.—At current quotations old material is finding slow sale. The market generally is steady, stocks most needed being firmly held, with some irregularity in material less inquired for. Current quotations for delivery in buyer's yards are about as given below: No. 1 steel scrap, $17.25 to $17.75; low phosphorus scrap, $20.50 to $21.50; old steel axles, $20.50 to $21; old iron axles, $23 to $24; old iron rails, $23 to $24; old car wheels, $16. to $16.50; choice R. R. No. 1 wrought, $21.50 to $22; machinery scrap, $16 to $16.50; wrought turnings, $14.50 to $15; cast borings, $11.25 to $11.50; stove plate, $13.50 to $14; wrought iron pipe, $16.50 to $17.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Feb. 7.

Pig Iron.—The market for the past week was a repetion of the week previous. It was quiet, with contracts taken making only a fair tonnage. There was very little buying for immediate shipment, the bulk of that done being for delivery the second quarter, with individual transactions ranging from 100 to 300-ton lots. Bessemer and basic grades were mostly in demand, and very little foundry iron was booked. The dullness in foundry brands is most marked, from the standpoint of sales, but inquiries are out for a large tonnage. From the way they peter out, however, it would seem as if they were only intended for "feelers." One local foundry, which has been a very heavy buyer for the past few months, withdrew an inquiry it had out for 5,000 tons for delivery the second quarter, because none of the bids submitted to it came within 50 cents per ton of what it considered a fair figure. Other inquiries for foundry grades, making a fairly good tonnage, were withdrawn also, but for other reasons. It may be that the course of prices recently has been a contributing cause. At times they show both a tendency to recede and to advance, but fixity in either direction has not materialized. This is mostly true of Southern brands. No. 2 foundry sold in small lots during the past week at $13.50 Birmingham. It is insisted, however, that the market is $13.75, while there are some furnaces quoting $14, but are not making any sales. In Northern irons No. 2 foundry is reported to have sold at $16.50 at Eastern Pennsylvania furnaces, but it is contended that $16.75 is the best that can be done, with $14 heard here and there, but with no sales. Not in some time have we noted such reluctancy to predicting the future course of the market as during the past week. New York quotations at tidewater follow: Northern No. 1 foundry, $17.50 to $18; No. 2 foundry, $17.25 to $17.50; No. 2 plain, $16.75 to $17; Southern No. 1 foundry, $17.50 to $17.75; No. 2 foundry, $17 to $17.25; No. 3 foundry, $16.50 to $16.75; No. 4 foundry, $16 to $16.25. Pig iron warrants are as follows:

	Bid.	Asked.
February	$.....	$.....
March	16 05	16 20
April	16 05	16 30
May	16 05	16 30
June	16 05	16 30
July	16 05	16 30

Finished Iron and Steel.—The business in structural shapes during the past week was quiet, so far as actual sales were concerned, which were all in small lots. The American Bridge Co. booked an order for 2,000 tons from the New York, New Haven & Hartford Railroad, and the Northern Pacific increased its order for 5,000 tons, noted last week, to 5,500 tons. The outlook for the immediate future in fabricated steel is very good. There are specifications out from Eastern railroads aggregating between 40,000 and 50,000 tons, and contracts for the major portion of this have practically been taken by the leading interest. There may be a little delay in the signing of the papers, however. Western roads have been out of the market recently, and give no inkling as to when they are likely to be heard from. In the building line everything seems to be in embryo for the time being. In plates, bars and sheets there were no developments of importance, new business being light, while that in sheets was mostly for forward delivery. New York prices at tidewater follow: Angles, 3 to 6 in. x ¼ in. and heavier, 1.64½c; beams, 3 to 15 in., 1.64½c; channels, 3 to 15 in., 1.64½c; beams, 18, 20 and 24 in., 1.74½c; tees, 3 x ¼ in. and heavier, 1.69¼c; plates, carloads, tank, 1.64½c; flange, 1.74½c; marine and ordinary fire box, 1.84½c; refined iron bars, 1.64½c; soft steel bars, 1.54½c to 1.60c; sheets, in carload lots, New York, No. 28, black, 2.50c to 2.55c; galvanized, 3.55c to 3.60c.

Old Material.—Light sales were the rule during the past week, with heavy steel scrap most in demand, but with offerings low because of reduced stocks. In wrought scrap there has been a notable falling off in demand. In heavy and light cast there is very little doing also. Prices on the whole are well sustained, but the undertone is not as strong as it has been.

Old iron rails	$20 00 to 22 00
Old steel rails, long lengths	16 00 to 17 00
Old steel rails, short pieces	15 50 to 16 50
Relaying rails	21 00 to 22 00
Old car wheels	16 00 to 16 50
Old iron car axles	21 00 to 21 50
Old steel car axles	17 00 to 18 00
Heavy melting steel scrap	16 00 to 17 00
No. 1 railroad wrought scrap	19 00 to 21 00
Iron track scrap	17 00 to 18 50
Wrought pipe	13 00 to 14 00
Ordinary light iron	12 00 to 13 00
Cast borings	10 00 to 10 50
Wrought turnings	12 50 to 13 50
No. 1 machinery cast	15 00 to 16 00
Stove plate	12 50 to 13 00

BIRMINGHAM.

BIRMINGHAM, Ala., Feb. 7.—The extremely inclement weather in this district has not so far interfered with the pig iron production and the indications are that there will be no change in the output. The raw material bins at the various furnaces in the Birmingham district are pretty well filled and the production continues. There have been no large lots of iron sold in the Birmingham district in the past week or so, but the aggregate of sales made shows up satisfactorily and the manufacturers are in a pleasant mood. There are one or two companies in this section behind in deliveries, but efforts are being made to increase the iron output and hopes are entertained of shortly being up to all orders. The shipments of pig iron from this district have not been as steady in the past few weeks as they might be. Accumulated iron seen on the yards only awaits instructions for delivery, it is announced. Quotations have not changed any in the past week, $13.50 to $14 for No. 2 foundry being the popular price. Local consumption continues heavy, the steel plants, cast iron pipe factories, foundries and machine shops requiring their usual quota.

Some healthy inquiries are being received by the Birmingham manufacturers, but no large-lot sales are given out. The iron men all appear confident that the conditions are going to hold up and that the production is not likely to be so great as to force down quotations. The demand, it is believed, is going to be active through the better part of the year. Sales have been made for quite a tonnage during the second quarter with some small lots sold for the third and fourth quarters.

The following quotations are given: No. 1 foundry, $14 to $14.25; No. 2 foundry, $13.50 to $14; No. 3 foundry, $12.75 to $13.25; No. 4 foundry, $12.50 to $13; gray forge, $12 to $12.50; No. 1 soft, $14 to $14.25; No. 2 soft, $13.50 to $14.

The strike of the union coal miners at the mines of the furnace companies is still on. It is stated by officials of the furnace companies that every day the strike is forgotten more and more. With the exception of the Blocton mines (T. C. I. & R. R. Co.), which do not supply coal for furnace operation, there is an increased production of coal reported at the various colleries in the State. The visit of John Mitchell, president of the United Mine Workers of America, to the Birmingham district may have some significance, though officers of the Alabama district organization among the union miners assert that the president of their order is only making a friendly visit and looking into the conditions in this State.

G. W. Hays and Edward Wingate have purchased the plant of the Wulburn Machine & Foundry Co. in Birmingham, have organized the Vulcan Foundry & Machine Co., and will manufacture saw mills, edgers, lumber trucks, cut-off saws, mine specialties and do a great repairing business. Messrs. Hays and Wingate have had experience in the business.

There is no hesitation in the activity in the steel mart in this section. The fourth open hearth furnace at the plant of the Alabama Steel & Wire Company at Gadsden, will be completed within a few weeks and it is proposed to begin making steel there at the earliest possible moment. There is positively no accumulation of finished steel articles in this district. Rail, rod, wire, nails, plows and other goods find a sale as rapidly as they can be manufactured and it is admitted that strong quotations prevail.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Feb. 7.

Pig Tin.—Owing to heavy arrivals, spot sold off about ¾c from our last quotations. The quantity of metal afloat is large also, and it looks as if prices for the next few weeks were going to be lower. Actual trading is moderate. In London the market has been very feverish, and a decline since our last report of £1¾ is noted in spot. Closing prices today follow: Spot, 29.00 to 29.50c; February, 28.62½ to 29.00c; March, 28.50 to 28.80c; April, 28.37½ to 28.75c. London's closings today follow: Spot, £131; futures, £129 17s 6d. Arrivals for the month to date aggregate 1,165 tons, with 4,220 tons afloat.

Copper.—It would be difficult to conceive a duller situation then that which prevailed during the past week. Buying for export, which has been the leading feature of the market for months past, has fallen off considerably, and the domestic demand is very light. Prices, however, show no change. London during the week has been quiet, with prices lower than a week ago. Today's closings follow: Lake, 15¼ to 15⅜c; electrotype, 15⅛ to 15¼c; casting, 14⅞ to 15c. London's closings today follow: Spot, £67 5s; futures, £67 11s 3d. Exports for the month to date amount to 1,173 tons.

Spelter.—Has been active and higher with 4.55 to 4.60c for spot. St. Louis is unchanged at 4.37½c. London declined to £12 11s 3d.

Spelter.—Is quiet and easier at 6.10 to 6.20c for spot. St. Louis is weaker at 6.00c. London lower at £24 15s.

Antimony.—Cookson's is lower at 8.25 to 8.50c. Hallet's is weaker at 8.50 to 9.00c. Other grades are fairly firm at 7.37½ to 8.00c.

Quicksilver.—We quote $40 per flask of 75 lb. lots of 100 flasks. London is £7 12s 6d.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for small quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Feb. 7.

The demand for metals continues of a very weak nature. Prices are shaky, and a good sized order would doubtless bring out several variations from the quotations given below. Our prices are as follows: Lake copper in carloads, 15⅜c; in less than carloads, 15⅝c. Casting copper, in carloads, 15⅛c; in less than carloads, 15⅜c. Pig tin, carloads, 30c; less than carload lots, 30½c. Spelter is strong at 6c to 6½c for carload lots, and 6½c to 6¾c for smaller lots. Sheet zinc is unchanged at 7¼c for carload lots of 600-lb. casks, and 7½c for less than carload lots. Pig lead, 4.45c for 50-ton lots; 4½c for carload lots, and 5c to 5¼c for less than carload lots. Antimony is 9½c for Cookson's, and 9c for Hallett's in small quantities. Nickel is 45c to 60c, according to amount and deliveries.

Old metals are in fair demand, though prices continue weak. Dealers' quotations are approximately as follows: Copper wire, 13¼c; copper, heavy, 13c; light copper, 12c; red brass, 11⅞c; red brass borings, 10c; yellow brass, 9c; yellow brass borings, 7⅞c. Lead, 4¼c. Tea lead, 3.70c. Zinc, 4½c.

National Sash Weight Makers' Association.

The National Sash Weight Makers' Association was in session in Cleveland the first three days of this week. There were 45 firms and companies represented. The primary object of the association is to so regulate the sash weight business, of which it controls about 85 percent of the entire product of the country, that freight charges will be reduced to a minimum; that is, the country is divided into districts and the trade of each member of the association is confined to territory within a short distance of his plant. The executive committee was in session Monday and on Tuesday there was a general discussion of business of the association by its members. Wednesday was given up largely to informal discussion and entertainment. Tuesday evening a banquet was tendered the members of the association by the members of the Central district. The toasts were responded to as follows: "Competitors as Friends," Wm. A. Ross Jr., of Wm. A. Ross & Bro., New York; "The Dollar Value of our Association," W. N. Reed, of the Somerville Iron Co., Somerville, Mass.; "Our Association," E. E. Brown, president of the association, of E. E. Brown & Co., Philadelphia; "Our Friend the Jobber," J. J. Wemple, of the Ohio Sash & Door Co., Cleveland; "Trade Journal Prices," George Smart, of *The Iron Trade Review*, Cleveland; "The Business Outlook," N. S. Calhoun, of the Johnston & Jennings Co., Cleveland and Chicago; "Cleveland, the Queen of the Lake," H. B. Chapman, Cleveland. At the conclusion of the banquet, which was gracefully presided over by Mr. James C. Brainard, of the Johnston & Jennings Co., a vote of thanks was tendered to Mr. Brainard, secretary of the association, and the members of the central district for their very successful efforts to make the convention a success.

H. C. Frick has plans prepared for the erection of a 22-story annex to the Frick building at Pittsburg. The annex site is 120 ft. long and 95 ft. wide and work on its erection will be commenced on April 1.

A spark from a workman's torch falling upon oily waste and a greasy floor, caused a fire Feb. 7 which destroyed the Rome Merchant Iron Mill, Rome, N. Y., entailing a loss of $200,000, partially covered by insurance.

Andrew Carnegie has presented $125,000 to Rensselaer Polytechnic Institute of Troy, N. Y.

CORPORATION BUYS BESSEMER IRON.

(Special Telegram.)

PITTSBURG, Pa., Feb. 8.—The United States Steel Corporation today closed for the purchase of 25,000 tons of Bessemer for February delivery at $15.50 at the furnace. W. P. Snyder & Co. received 10,000 tons and the Bessemer Pig Iron Association took 15,000 tons. The association had steadfastly refused to accept less than $16 at the furnace for its iron and that it accepted $15.50 would indicate a slight weakness.

However, other operators were willing to furnish their iron at this price and since the association furnaces refused to accept any business for January delivery at $15.50 and it was readily placed elsewhere, it was deemed advisable to accept the slightly lower price offered.

President Dinkey will not Resign.

(Special Telegram.)

PITTSBURG, Pa., Feb. 8.—Carnegie Steel Co. officials this morning emphatically denied daily paper reports referring to the contemplated resignation of President Dinkey and other officials. The report that it is intended to erect twelve open-hearth furnaces at Homestead is also emphatically denied.

This week six of the twelve furnaces of the Donora plant of the Carnegie Steel Co., Pittsburg, were placed in opration. This open-hearth plant was acquired by the purchase of the Union Steel Co., and has been completed for more than a year, but was never operated, for the reason that the demand for steel was never sufficiently great since its completion to warrant its operation. No. 2 blast furnace at this plant will be fired before the end of the week. The North Sharon furnace of the Carnegie Steel Co., Sharon, Pa., is expected to blow in this week and with these furnaces in operation the company's only idle furnace will be the Zanesville stack. All of the Isabella and Lucy furnaces are now on, repairs having been completed recently.

The American Locomotive Co. has received inquiries for 125 locomotives from foreign lands, where the company is making every effort to increase its business. The foreign business of the company has been growing steadily for some time. Since the Montreal plant was purchased last year, the company is in a better position to handle export trade.

The convention of the Southern Supply and Machinery Dealers' Association, which will be held at the De Sota Hotel, Savannah, Ga., April 25 to 28, promises to be of unusual interest. Savannah is one of the most beautiful cities of the South, and in April will be seen at its best. Elaborate arrangements are being made by the entertainment committee to give the visitors a delightful time.

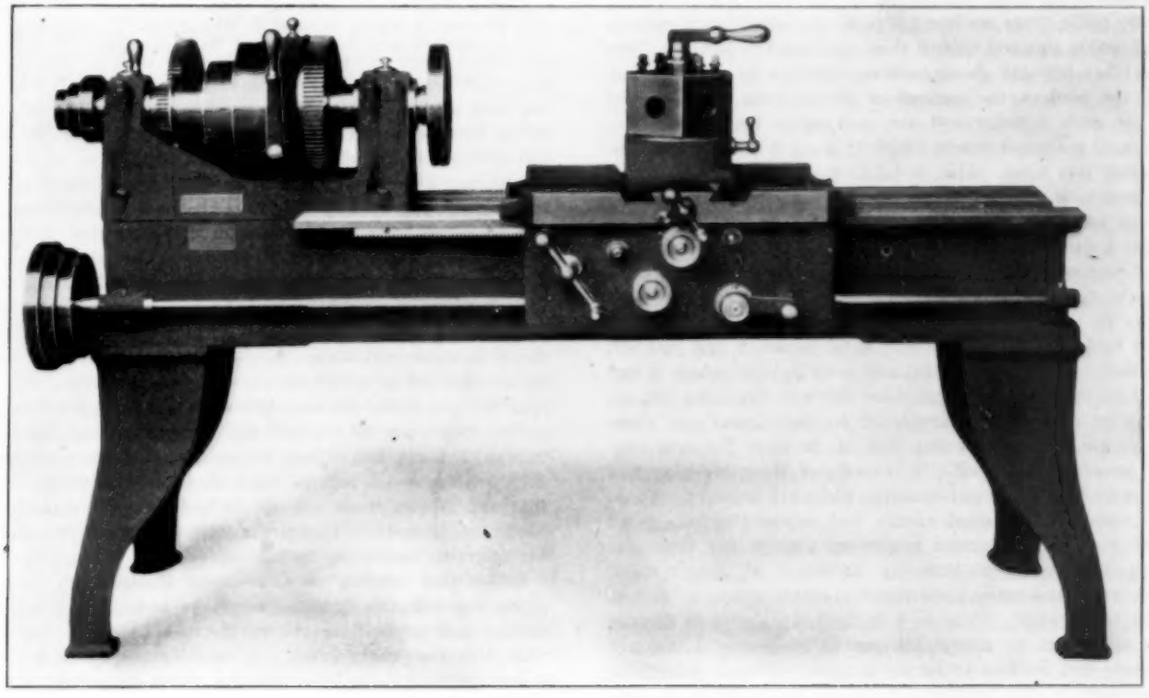
John F. Allen, 370-372 Gerard avenue, New York City, manufacturer of the Allen portable pneumatic riveting machines, who recently established an agency with A. H. LeHand & Co., Mexico City, Mexico, has received an order from this firm for six Allen riveters to be shipped the Cia Consolidada de Construcciones Metalica, S. A. of Mexico City, Mexico.

The property of the Lansing Boiler & Engine Works, Lansing, Mich., has been sold to H. E. Thomas for $14,850. It has not been announced what use will be made of the property.

A MANUFACTURING TURRET LATHE.

Recent developments in modern shop practice, and the present extensive use of special high speed tool steels, have made the ordinary engine lathes of the past entirely inadequate to the greatly increased duties now imposed upon them. To meet the changed conditions and new demands the American Tool Works Co. of Cincinnati, has built especially for use of automobile builders, gas engine manufacturers, and others having similar lines of work, the "American" manufacturing turret lathe shown in the illustration. This machine can be furnished in several sizes.

The bed is of deep section, of patent drop-V pattern giving two inches additional swing, and has cross box girts at short intervals the entire length. This construction gives exceptional rigidity. The headstock is solidly bolted to the bed and is very heavy. The spindle is special high carbon steel, accurately ground, and has large hole the entire length. The bearings are best quality phospher bronze, (no babbitt metal), with improved oiling facilities, and with means for any necessary adjustment. The carriage is very heavy, especially in the bridge, due to the drop-V bed, has continuous bearings



A MANUFACTURING LATHE.

on the ways and is gibbed to bed for entire length. It has extra wide dovetail to give turret slide full bearing on carriage bridge and there is no overhang to turret. An easily adjusted, and very long gib is used on this slide.

The turret is very heavy, hexagonal in form, and provided with substantial locking device of tool steel located in a convenient position. The feeds are three in number, both cross and longitudinal, obtained through belt driven feed rod. Powerful friction locking devices are used in apron. A convenient stop is furnished for centering the turret when boring.

The lathe is built in various sizes and with plain back geared or friction geared head, belt or geared feed, with or without screw cutting feature, and other attachments usually furnished with engine lathes. It is a powerful, accurate and simple tool for manufacturing purposes and is easily handled.

Some automobile builders have purchased as many as twelve of these tools at one time, showing conclusively the value of the machine for the work in question.

Core Sand Binders.*

BY J. S. ROBESON.

It is true that every material used for this purpose is a compound; but so is the sand a compound; so is the pig iron a compound; though certainly no salesman has yet had the nerve to offer you any Carnegie chill casting compound under the impression that you would recognize it as pig iron. The materials in question are employed solely for their adhesive qualities.

You may say that they do other things, but be that as it may, the basic reason for their use is to bind the sand together so that it will take and hold the desired shape. Certainly such a material is a sand binder and when used for cores, a core sand binder. This is my plea and I hope my justification for the new name. Perhaps this question of a name is along of a line with some other points in core shop practice in that they need more attention, that they need changing, that they need reform. It has been brought forcibly to me again and again as I travel from foundry to foundry that the core shop has suffered, and is suffering from neglect.

On page 157 of the *Foundry* for December, in an article by Charles A. Smith, note the following words; "Every superintendent ought to get acquainted with his core room foreman and give him credit for what improvements and additions he can make in the department, for the core room is certainly an important department and much saving can be made here by close attention to details." That is a strong call from the man in the shop. Can you afford to be deaf to it?

Because you happen to pick up—after a few trials—a man who can make cores without much loss of labor, sand or castings with the local sands and binding materials, hence the convenient ones, or with some that he or you used elsewhere with success, then you think your problem has been solved. And you are wrong.

I believe that I am perfectly safe in saying, and this without any intention of throwing bouquets at you, that in ad-

*Read at the February meeting of the Pittsburg Foundrymen's Association. Mr. Robeson is president of the American Glutrose Co.

dressing the Foundrymen's Association of the Pittsburg district, I am addressing the men who have made a closer study of the business than any other such body in the United States and yet I doubt if there are five of you tonight who can tell what their binders cost per ton of sand mixed; not half who can tell off hand, with any accuracy, what their core sand mixtures are and I will warrant if there are any who think they know, that one visit to their core room will prove they are in error.

For a reason, which is not quite clear to me, the men in this trade, do not get the assistance from the shop foreman, the foundry superintendent and the office force that the molders or the cupola-men receive. A man who is thus forced to work out his own salvation, alone and unaided, without help or assistance from that part of the management that is supposed to know more, will naturally make workable cores from the materials at hand, if he can. They may be the best, they may be the worst permissible, but he does not know the degree of their goodness or badness nor anything as to cost and this because there is no method of comparison.

Here is a trade without a literature. Can you expect progress from a nation without a written language? In what is probably the most read book of the few relating to the foundry trade, there are just 4½ pages devoted to core making out of nearly 400, and half of these 4½ pages is padding. This neglect has brought about another condition of affairs. The sand, the binders, the manner of drying have been worked out for each foundry and the coremaker that lasted long enough to get good results has held the job until he and not the office was tired. This fact has made him narrow, localized and with a high opinion of his own skill in sands and binders and therefore difficult to teach. As an example of this, and also of several other related points, I recollect meeting a boss coremaker a short time ago who was dissatisfied with the results he was having.

This in itself was remarkable, and especially so, because in my business of selling a core sand binder, I had just left the office of the company he was working for, where I had been told that they could not even listen to my story because they were getting good results from their cores and there was no use in disturbing any part of the plant that was running smoothly and well. It turned out that this man had been working for a rival concern, located a few miles away, and because of his good results had received and accepted an offer from his present employer, who at the time was having trouble from excessive breakage of cores, much blown work and many condemned castings, owing to defects in the cored work. Now he had used my binder in the old shop and I was, of course, curious to know why I had lost his trade and anxious to secure it again. I knew something of the sands in that locality and after an examination of those he was using, I worked out the following story. The figures that I now give are not the actual ones but are relatively correct.

The sand mixture in his old shop was:

30 percent old or gangway sand	$ 0 00
30 percent loamy sand, at $1.80 per ton	0 54
40 percent bank sand, $0.75 per ton	0 30
Total	$ 0 84

One part of gluetrin to 40 parts of sand.

This binder cost 15c per gallon or 3¾c per quart delivered. The sand ran 900 quarts to the ton and on these figures the binder cost 84 cents per ton of sand mixed and the total cost for each ton of core sand, ready for cores, was $1.68.

The new shop had been using,

40 percent sharp sand at $1.20 per ton	$ 0 48
60 percent loamy sand at $1.80 per ton	1 08
Total	$ 1 56

1 part of flour to 12 parts of sand.

Flour at that time cost $25.00 a ton and on a weight of 1.1 pounds to the quart the cost of binder per ton of core sand mixed was $1.03 and the total cost for each ton of core sand, ready for cores, was $2.59 per ton. The work from these cores was bad. They had tried rosin, on and off, with equally poor results.

With these two sands, which were different from the loamy and sharp sands of his old shop, this man tried, with and without old sand, gluetrin as he had used it before and failed. He then went back to the original practice of this shop—flour—and by changing the mixture slightly and seeing that the proportions of the sands and the sands to the flour did not vary, and forbidding the coremakers to run to the flour sack whenever they liked, which had previously been allowed, he managed to get much better results than they had formerly secured. This satisfied the office but the work was not as good as in the old shop. He knew it and was dissatisfied but apparently helpless. Here was a man that looked ready for my material and, in spite of his failure, was easily persuaded to try it again.

I was certain after examining his sands that the whole trouble was in the sand mixture and several were tried, this being finally adopted as the most satisfactory and economical.

40 percent old or gangway sand	$ 0 00
40 percent loamy sand at $1.80 per ton	0 72
20 percent local bank sand at $0.75 per ton	0 15
Total	$ 0 87

1 part of gluetrin at 3¼c a quart to 50 parts of sand cost 67½c per ton of sand mixed and the total cost for each ton of core sand, ready for cores, was $1.54½.

This was successful, reduced the breakage of cores and did away entirely with any blown castings or trouble from the size of cored holes, besides making a clear saving of $1.04½ on each ton of core sand mixed. But note—here was an intelligent man of his class, holding a responsible position—he had charge of twenty-five coremakers—who, after one or two trials had given up his problem and drifted back into practically the same methods as this shop had always used. It seems to me that there were two causes at work here. The one that his superiors did not know enough to push him for better results nor to aid him with suggestion, and the other, that he, himself, lacked sand experience—did not realize that simply because sands look alike they may be different and that one or two trials are not sufficient to test a sand or a binder. Incidentally he learned how to figure the cost of his mixture; something he had never done before.

Under this heading of Core Sand Binders, any material possessing adhesive qualities might be included. Local conditions and sands have caused the use of some that seem absurd to the general trade. A consideration of these freaks is omitted and only those that are found in general use are considered. These are:

Solids

1. Dextrine
2. Flour
3. Proprietary Dry Mixtures
4. Rosin

Liquids

1. Fish oil
2. Glue
3. Gluetrin (Proprietary Liquid)
4. Linseed oil
5. Molasses
6. Proprietary Oil Mixtures
7. Rosin oil

At the first glance it is seen that these can be divided into two distinct classes—the solids and the liquids. It is to the difference in action of these two conditions of matter, when used as core sand binders, that I wish especially to call your attention, and not to the merits or demerits of any particular one.

Let us consider the work that is required of a binder. The local conditions in each shop vary greatly and it is only

possible to name these requirements in a general way.

A good binder must make a core that

1. Is strong both green and dry.
2. Is weak and rotten after the casting is cooled.
3. Is not easily affected by moisture.
4. Will give off but little gas.
5. Will dry quickly.
6. Will not change in size.
7. Has a low cost.

The ideally perfect core sand binder is one that mixes easily with the sand, making a mass that packs with but little work in the box, leaves it freely and leaves it clean. Is strong enough before baking to stand alone, without sagging or deformation and retain sharp edges. Such a core must now bake in the shortest possible time and when baked be hard enough to stand rough handling, be weak enough to yield to the contraction of the iron in cooling, porous enough to permit the gases to escape freely, and after cooling leave the casting easily and cleanly.

The usual method of preparing the mixture is to put on the floor the required quantity of each kind of sand, previously selected by the foreman or boss core maker, and to spread or sprinkle on top of this pile the necessary amount of the dry, or liquid, binder that is to be used, afterwards wetting the mass, as may be required, with water.

This pile is then cut over and shoveled, being finally put through a riddle and then delivered to the coremakers or put in a pile ready for their use. There are various modifications of this practice in the way of riddling the sand before the binder is put on, mixing in a machine, etc. Every step that is taken to increase the thoroughness of the mixing is a step taken in advance. The more perfect the mixture the better the core.

If you are using a dry binder, flour for example, and it is simply dumped on the pile of sand, wet down and put into barrows, wheeled to the coremaker and made up into cores, you will have a core that consists of a gob of flour with a little sand in it, next to a gob of sand with a little flour in it.

It does not take a very wise man to know that such a core will be weak and it is a fair presumption that when the hot metal strikes one such loaf of bread in the core there will be a large volume of gas given off at that point and a resultant blown casting. This is actually the condition that exists in every core made with a dry binder to a greater or lesser extent. The more thoroughly the sand and binder are stirred and mixed together, the more even will the distribution be and the more nearly will the ideal condition be reached of having each grain of sand surrounded and attached to the next grain by the binder. For this reason dry binders should be very finely ground—be very much finer than the sand. This condition of fineness is true of flour, not quite so true of rosin and not nearly so much so of the dry binder mixtures on the market.

Flour is delivered in a much more finely ground condition than any particle of ordinary sand and if kept dry, will remain loose and free from lumps. Rosin is not usually, in fact I think never, so finely ground but, even if so, will immediately, because of the moisture and heat in the air, under normal conditions, commence to stick together and ball up. All the dry mixtures sold will act in the same way as rosin, in varying degrees, so that the result, with these two latter materials is that, however much labor may be spent on the mixing, the mass will never be nearly so uniform as with flour.

If flour is therefore the best, let us see how bad it is. The sand is composed of grains, varying in size from particles as small as a needle point up to ¼ inch. The variation in the shape of these grains is much greater than in the size and in fact the shapes met with are so various that they cannot be numbered. This matter of shape, as long as the size is within the limits already mentioned, is the most important. Roughly speaking these grains may be divided into two kinds, those that are angular, having sharp corners and numberless projections and recesses; those that are rounded, the projections having been rubbed off so that the grain is a more or less true sphere with a highly polished surface.

Some years ago I was engaged in the manufacture of steel by the basic Bessemer process and, as part of our practice, it was necessary for us to make dolomite bricks. For this purpose we used an exceptionally pure dolomitic limestone, which was crushed in a jaw crusher, then pulverized to nearly the fineness of flour, dampened with water and pressed into building brick form and size on an ordinary brick press, then calcined at a very high temperature. The work of making these bricks was progressing very satisfactorily, the breakage in handling from the brick press and in piling in the kilns being practically nothing when there was offered to us a limestone from another quarry. Repeated careful chemical analyses of this stone, showed that it differed but little from that we were using. If anything it was more nearly pure and a contract was placed for a large tonnage. Shipments arrived and were dumped and used indiscriminately with the older stone. Later investigation showed that they were probably in about equal proportions in the stock pile, so that the pulverized material coming to the brick press was about half and half of each stone. With its use trouble immediately resulted. The bricks were very weak, as they came from the press. Fully 25 percent were broken in the handling at this point and from 10 to 15 percent more when piling in the oven. Various means, such as increasing the water, the pressure on the press, etc., were tried but with no success in doing away with the trouble. Instant relief was necessary so that the use of the new stone was stopped, with an immediate stoppage of the trouble, while the investigation proceeded. The microscope finally told the story, as it showed that the older stone crushed and pulverized into granular grains, while the newer stone gave almost perfectly rounded particles. The geological explanation carried this back to the manner of the original deposition or formation. It can easily be realized that under pressure these granular pieces would knit into one another, projection into recess, so that their very shape made a strong bond, whereas the rounded grains would simply have their polished curves the one against the other—without bond and in fact of a position and of a shape to encourage a sliding or rolling action and consequent weakness and breakage. This same story is exactly and similarly true of the core sand. The bond is increased in the cores, however, by the use of some added material, that by the aid of water or of heat becomes adhesive or is so of itself. This, however, is but an aid. It does not change the conditions produced by the first shape of the sand grains. The more angular they are the less work the added adhesive has to do, the more rounded, the greater the work.

There is a common expression used in the foundry, that a sand is sharp, and on examination, I have found that such a sand invariably shows the angular grains to which I have referred. I have not come across, however, any expression or word or name, that denoted the reverse of this condition, the non-sharp kind. All of the non-sharp kind that I have used contained some loam or clay, so that for want of a better name, I have called this loamy sand. Now I do not know whether it is true or not that these rounded grains only occur with the loam admixture. It is my experience, however, that the two always appear together, and when they do so appear, that the loam acts as a binder. Thus the two kinds of sand, the sharp sand and the loamy sand, are both, in a measure, self-binding though from entirely different causes and the bond, as formed, is of a different nature. I have never found a case where, what might be termed the angular bond, was strong enough to make a core without an added binder, but I know of one loamy sand, and there are probably others, from which hard cores can be made without the addition of any adhesive.

In the New England district the universal base of all core sand mixtures is beach or bank sand and the usual binder is flour, together with a small amount of the proprietary dry mixtures. These sands are sharp, of varying degrees of fineness, and in all probability from the same source, the sea shore. The present beach sand being sometimes dug from a little distance back from the tide line, or directly on the beach, thus subject to daily intermittent soaking with salt water, or dredged from under the water. It may thus be more or less weathered or strongly impregnated with salt. The bank sand is from inland points and if these deposits are, as I think but the remains of an ancient sea shore, then the only difference between the two sands is that the one has been weathered and washed free from salt and the other has not.

In the foundry district in and around Philadelphia there is a very large amount of Lumberton, Millville and other sands containing loam or clay used. The characteristic core sand of this section is thus a loamy sand and the usual binder is flour and a certain amount, greater I think than in New England, of the proprietary dry mixtures. Here now are two sands entirely unlike in their physical conditions and self-binding powers that are in practice bound and made into cores with the same adhesive material—flour—and requiring about the same amount. It is evident, therefore, that the binding power of the angles on the sharp sand is replaced by the adhesive property of the loam in the loamy sand. From this view of the situation, it would seem that it made no difference which sand was used, that the one was as good as the other.

There is, however, a very great difference in the structure of the two cores. With the sharp sand, the angles fit into one another but not perfectly. The flour particles press into the recesses, rest on the projections and lay against the body of the grain but not flatly, completely, perfectly, the very irregularity of the shape makes the joint between the grains of sand themselves, as well as with the binder, imperfect, and as a consequence the mass is not solid nor compact but consists of grains tightly and perfectly joined at different points to the surrounding grains but with open and unjointed parts at other points. In other words, the interstices are not completely filled. Thus the core is porous, though strong, with ample opportunity for the travel through its interior and out to the surface of any gases that may be generated.

With the loamy sand the story is different. Here the binding is entirely dependent upon the adhesive strength of the loam and the flour. With the addition of water these two mix intimately and easily, and as the rounded and polished surfaces of the sand grains come together under the pressure of the ramming, this fluid mass of adhesive, greater in proportion to the whole mass with the sharp sand, you must remember, is forced and flows into the open space between these grains a much smaller space than with the angular sand and as a consequence these intergrain spaces, that would form passages for the travel of the gases, are almost closed up. In other words, the interstices are almost completely filled. Thus the core is strong, with the same amount of flour is actually stronger than when made from sharp sand—but very dense and compact. As a proof of this you will find that the man who is using sharp sand as his base for cores, seldom or never talks about trouble from his cores blowing. He cares little whether the core sand binder offered him has gas in it or not but the man using the loamy sand is ever on the watch for that point. He knows that he must be careful and, because flour gives off so much smoke and gas when the hot metal strikes it, he is ever seeking for a substitute that will give him less trouble and reduce his loss from core-blown castings.

Now it has been noted that the binders commonly used can be divided into two classes, the solids and the liquids, and also that in preparing the core sand mass, water is invariably added. With the exception of the rosin all of these dry binders are more or less soluble in water. The rosin, after it has been mixed and molded, likewise becomes liquefied or partly so, because of the heat in the core oven. At the first glance it would seem then that they all became liquids during the operation and that there is thus really but one class of binders. This is not entirely correct, because, first some of the mixing is usually done before the water is added, and, second, because only enough water can be added to make the mass properly damp for ramming. This amount is not sufficient to make the dry binder thin, fluid, and in a condition to run freely through the sand. The most casual examination of a rosin made core, will show that the sand and binder are very improperly mixed. The rosin can be seen in spots throughout the mass and it is, as a fact, the poorest and per unit of volume, the most expensive of the binders, mainly because of the impossibility of proper mixing. This but goes to prove, the well known fact, that a more uniform mixture can be attained when a liquid and a solid are put together than when two solids are used. The thinner the liquid the more easily will it run through the mass of sand and the more rapidly and completely will it cover each grain. It would, therefore, seem that a liquid binder would, with the least work, give the most perfect mixture, provided, of course, that it was thin enough when put on the sand to flow freely through it. It must, also, be sufficiently adhesive per unit of bulk so that the amount added will not make the sand too damp.

Some experiments recently made, for the purpose of proving this theory, showed that the efficiency of all of the dry binders could be increased by better mixing but that the expense of so doing was greater than the cost of the binder that was saved as, aside from the difference between hand and machine mixing, this means, simply, longer continued work on the sand mass. With the liquid binders a somewhat different method seemed possible. Having the idea in mind that the thinner the binder the better the mixture, a material was selected, gluetrin, that mixed easily and readily with water, and a test was then made by putting this on the sand in the form of a spray with compressed air. At the foundry where this was tried their regular core sand mixture was:

20 percent old or gangway sand	$0.00
60 percent Millville gravel @ $1.40 per ton	0.84
20 percent local sharp sand @ .90 per ton	0.18
Total	$1.02

1 part gluetrin mixed with one part of water to each 50 parts of sand.

This sand ran 930 quarts to the ton and the binder, therefore, at 3¼c a quart, cost 70 cents per ton of sand mixed and the total cost for each ton of core sand, ready for cores, was $1.72. Their practice was to put the sand on the floor in three layers as dumped from the wheelbarrows. This was then shoveled and cut over about three times while dry. The gluetrin had previously been mixed with an equal amount of water and was then sprinkled over the bed of sand from a watering pot. The pile was shoveled over once, sprinkled with water, and put through a riddle on a pneumatic shaker and taken to the coremakers. In the first test with the compressed air spraying, the same amount of gluetrin and water was used and the cores were entirely too hard. Various trials were made until now their practice is to wheel in the sand and to put it on the floor as formerly but as the sand is shoveled and cut over, while dry, it is thrown rather high from the shovels and is met by a spray of gluetrin and water. This is done twice and it is then put through the riddle as before.

The sand mixture is now:

40 percent old or gangway sand	$0.00
40 percent Millville gravel @ 1.40 per ton	0.56
20 percent local sharp sand @ .90 per ton	0.18
Total	$0.74

1 part of gluetrin, mixed with two parts of water, to 70 parts of sand. Thus the binder costs but 50 cents per ton of sand mixed, and a total cost of $1.24 as compared to $1.72—a saving of 48 cents per ton.

Here is a credit for old sand, binder and labor due to the method of mixing alone, and a small debit for compressed air. As the oils and oil mixtures are too expensive per unit of volume for general use, and this without regard to their merits or faults in any other respect, but few tests were made with them. Such as were made, however, agreed with this result.

THE PATENT OFFICE RECORD OF 1904.

The annual report of the Commissioner of Patents, Frederick I. Allen, shows that the receipts from all sources during 1904 were $1,657,326.53 and the expenditures for the same period were $1,476,000.38, leaving a surplus of $181,326.15. This brings the January, 1905, balance in the Treasury of the United States on account of the patent fund to the total of $5,863,866.76. Comparing the business of 1899 and 1904 and the receipts show an increase of 25 percent; the expenditures, 21.8 percent; the patent applications and caveats, 26.5 percent and the number of employes has grown but 10.4 percent.

The amount of cash handled by the office, considerable of it in small sums, is liable to accident in transit or error in record as in the case of any other extensive business, but the claims of losses of cash transmitted through the mails have shown a marked decrease. The aggregate amount of alleged losses for 1900 was $728.40, and for the first eight months of 1901 $387.64, the measures adopted and put into effect in August of 1901 have reduced these claims of losses to $28.10 for the period of three years and four months from Sept. 1, 1901, to Dec. 1, 1904. The total receipts passing through the mail room in 1903 were $947,556.88. Complaints of losses for this period aggregated $2.95. The corresponding items for 1904 were: Total receipts, $1,020,700.87; total alleged losses, $3.85. It will be understood that these claims of losses included claims erroneously made as well as losses attributable to the mail service.

The growth of efficiency is strikingly shown by the elimination of office errors and this is the result of more careful methods plus the determination of individual responsibility. Taking the sums which were formerly paid out for errors in the preparation of patents for publication and the cost of these mistakes decreased from $1,380.16 in 1889 to $187.13 in 1903. Last year even better results were obtained and there were no errors of this type productive of expense to the office. A greater saving than this amount is due to careful examination of the supplies on hand and this in turn suggests the crowded condition of the office, a condition of affairs likely to be less convenient and satisfactory than ever under the pressure of increased business. The new trade mark measure provides for a considerable reduction in fees and this will tend to an increase in registration and necessitate greater facilities both in the force employed and in the space and equipment required for its transaction. A thoroughgoing search among the stored material of the office has brought to the surface some valuable supplies and doubtless has resulted in a more systematic arrangement of the stock on hand. This exploration work among the printed patents and the development of hitherto lost resources of have resulted in a saving from the amounts which would otherwise have been required for the purpose of reproducing exhausted copies estimated by the chief clerk at $39,030.40.

During the summer of 1904 eighty-three iron model-cases and about twenty-five thousand models were removed from the galleries of the Patent Office to the second floor of the Union building. This leaves less than one hundred models in the Patent Office building, and they will be removed to the Union building. The space formerly occupied by these cases is being used for the storage of printed copies of patents, patented files, and other official records.

In 1904 there were received 51,168 applications for mechanical patents, 818 applications for design patents, 157 applications for reissues of patents, 2,524 applications for registration of trade-marks, 1,335 applications for registration of labels, and 397 applications for registration of prints. There were 30,824 patents issued, including designs; 110 patents reissued, and 2,158 trade-marks, 1,114 labels, and 297 prints registered. The number of patents that expired was 20,429. The number of allowed applications awaiting the payment of final fees was 9,362, and the number forfeited for non-payment of the final fees 5,413.

In proportion to population more patents were issued to citizens of Connecticut than to those of any other State—1 to every 1,097. Next in order are the following: District of Columbia, 1 to every 1,146; Massachusetts, 1 to every 1,351; Colorado, 1 to every 1,394; New Jersey, 1 to every 1,452; California, 1 to every 1,453; Rhode Island, 1 to every 1,509; New York, 1 to every 1,614; Illinois, 1 to every 1,673; Washington, 1 to every 1,693; Ohio, 1 to every 1,908; Pennsylvania, 1 to every 2,064; Michigan, 1 to every 2,543; Montana, 1 to every 2,561; Oregon, 1 to every 3,086; Oklahoma, 1 to every 3,264; Missouri, 1 to every 3,301; Wyoming, 1 to every 3,304; Minnesota, 1 to every 3,474; Iowa, 1 to every 3,481; Wisconsin, 1 to every 3,555; Indiana, 1 to every 3,569; Arizona, 1 to every 3,841; Vermont, 1 to every 3,949; Maryland, 1 to every 4,117; Utah, 1 to every 4,130; Nevada, 1 to every 4,233; Kansas, 1 to every 4,376; South Dakota, 1 to every 4,724; Nebraska, 1 to every 4,749; Idaho, 1 to every 4,758; Delaware, 1 to every 4,992; New Hampshire, 1 to every 5,415; Maine, 1 to every 5,739; West Virginia, 1 to every 6,030; North Dakota, 1 to every 6,382; New Mexico, 1 to every 6,510; Florida, 1 to every 6,954; Texas, 1 to every 7,346; Virginia, 1 to every 7,957; Kentucky, 1 to every 8,420; Tennessee, 1 to every 9,486, and Georgia, 1 to every 9,983. The fewest patents granted in proportion to the number of inhabitants were in the following States and Territories: Alaska, 1 to every 31,720; Hawaii, 1 to every 22,000; South Carolina, 1 to every 19,147; Mississippi, 1 to every 17,236; North Carolina, 1 to every 15,272; Arkansas, 1 to every 13,115; Alabama, 1 to every 12,613; Indian Territory, 1 to every 10,887, and Louisiana, 1 to every 10,084.

As to foreign patents, 910 were granted to citizens of Germany; 830 to those of England; 412 to those of Canada; 331 to those of France. Russia is credited with 37 and Japan is in the same class with Turkey and has but 4. Africa is in the list with but one patent.

General Manager Coulby has adopted a bonus system for the masters of the Pittsburg Steamship Co. next season. A bonus will be paid to twenty masters of the first-class steamers that have the best general record for the season. Five captains that have the top record will be paid a bonus of 15 percent of their salary, which will amount to nearly $300. The next fifteen masters that are in line will get 10 percent of their wages. There are about forty first-class steamers in the fleet, so that half of the masters will be paid the bonus. The others who have poor records will stand a chance of being dropped into boats of a lower class if there are men in the second class who are entitled to promotion.

In answer to a query as to dividends by a stockholder recently, President Plummer of the Dominion Iron & Steel Co. replied as follows: "The question of the dividend on the preferred stock cannot, I am sorry to say, assume any definite shape for some little time, although I am hopeful that the earnings of the company will soon justify its resumption. You, of course, understand that all arrears of preferred dividends will have to be paid before any dividend can be paid to the holders of the common stock."

A NEW VERTICAL MILL.

The Gisholt Machine Co., of Madison, Wis., has its latest type of vertical mill depicted in the two halftones, Figs. 1 and 2. This machine tool is a 34 in. mill and is noteworthy for rugged proportions, all parts being especially rigid and heavy. In common with other vertical mills of the Gisholt Machine Co.'s design it has particularly broad bearing surfaces. In other respects there are a few deviations from the old designs, the principal variation being in the headstock. In all but this machine tool the company has introduced the friction back geared headstock. On the 34 in. machine there is a four step cone pulley drive and the back gears are thrown in or out by a positive clutch operated by lever.

It will be seen that the levers for the control of the machine

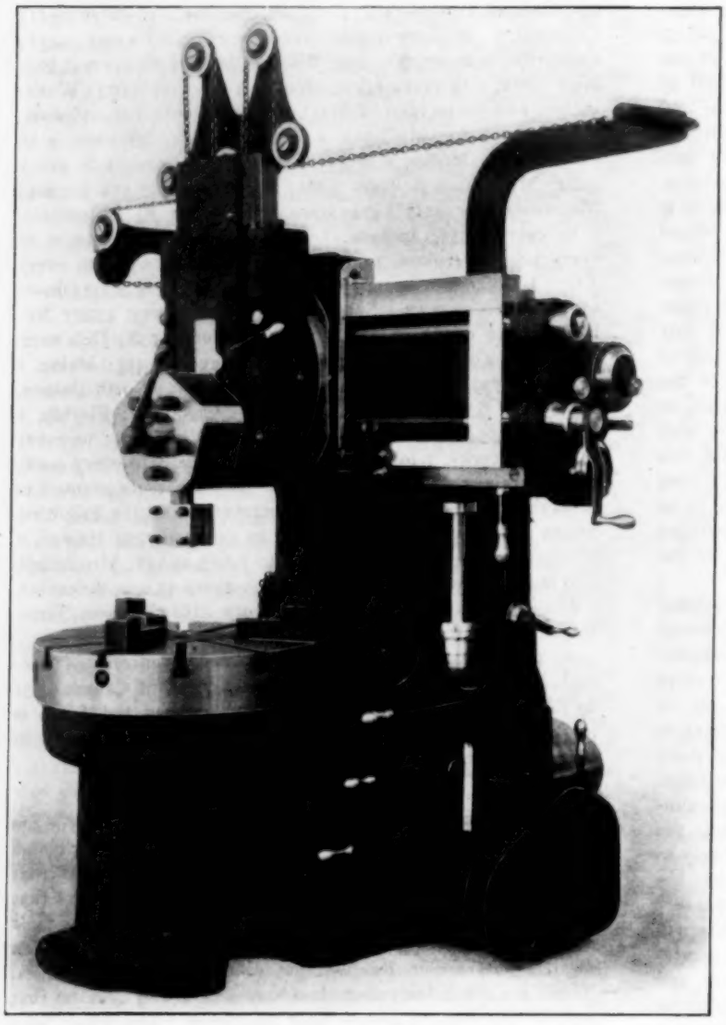


FIG. 1.—A NEW BORING MILL.

are very conveniently located within easy reach of the operator when he stands in his customary position. The mill is fitted with the fast tripping devices similar to those employed on the larger sizes and by this means any feed may be positively and automatically stopped at any predetermined point. The feed screws are all fitted with micrometer index dials reading to thousandths of an inch.

The table may be a universal and combination chuck having three movable jaws or a plain table with radial T-slots and independent jaws. The two speed countershaft provides sixteen table speeds. The mill is provided with eight changes of feed, all feeds being operated either by power or by hand. The illustration exhibits the tool with a screw cutting attachment and a swivel turret head. The spindle drive is of the pinion variety, the spindle resting on broad, self-oiling, babbitted surfaces. This 34 in. mill is also built with a plain head and without screw cutting attachment.

Sharing Profits With Customers.

N. O. Nelson, of St. Louis, recently celebrated the thirty-third anniversary of his presidency of the N. O. Nelson Mfg. Co., maker of plumbers' supplies, by giving a banquet to 350 employes, customers and friends. Profit-sharing and the co-operative plan naturally came up for discussion by the speakers of the evening, since Mr. Nelson was among the earliest pioneers in this method of conducting a business. An extension of his profit-sharing plan was announced, by which customers, as well as employes of the company, hereafter will share in the profits, each in proportion to the profit made by the company on the business done with him during the year.

"I see nothing attractive in the idea of accumulating wealth, or in leaving vast piles of it when I die, or in endowing institutions," said Mr. Nelson. "I prefer to endow individuals, rather than institutions. I think it better not only to let employes and customers of the firm have the benefits of the profits immediately, which they have helped to make, but, also, while I am living, to use what I already have for those purposes which I consider most needed."

The plan is described by Mr. Nelson as follows:

"We shall divide our profits, beyond 6 percent interest on capital, in the proportion of 1 percent on capital, 1½ percent on wages and salaries, and 2 percent to customers on the gross profits on their purchases. The profits on all our sales are figured. A ledger account will be kept with each customer, showing the amount of his gross profits, and at the end of the year footed and figured on in the same manner as the wages. In addition to this, the entire profit, without deduction for interest, on my stock, which is about four-fifths of the whole, excluding a small amount of preferred stock, which draws 6 percent interest and nothing more, will be divided at the rate of four-tenths to the customers, three-tenths to employes, and three-tenths for benevolent and public purposes, to be administered by me. Each customer will receive the proportion that his gross profit bears to the total gross profit. Gross profit is made the basis instead of purchase, because some goods bear much lower profit than others. These dividends will be paid in my stock of the company at a price on which the average net earnings of the next preceding three years would yield 6 percent net or in 6 percent preferred stock."

The Herring-Hall-Marvin Safe Co. reports for the calendar year 1904 a net profit of $35,297, after charging off $18,678 for maintenance and $15,277 for depreciation. A new plant was constructed during the year at Hamilton, O., and a new branch opened in Chicago. During the year production was curtailed somewhat with consequent smaller margin of profit. The present year opens with a good demand and better prices. There are now outstanding $190,000 gold debenture notes. The good-will account is put at $2,176,642. The capital stock amounts to $3,300,000. The annual meeting of the company is held in Jersey City today.

The American Car & Foundry Co. reports for the quarter ended November 30, net earnings $539,694.00, a decrease of $1,021.

CONTINUOUS CAR WHEEL MOLDING.

To the Editor:

Noting in your Feb. 2 issue an article on "Continuous Car Wheel Molding," I take the liberty of commenting upon it and criticising it, since it is assumed to represent the latest development in its line. In the first place, it is said that outside the car wheel line, no attempt has been made at operating continuously with a process that combines molding, casting and stripping. This statement shows a lack of information concerning the foundry methods of the country, since such systems have been in use in several different lines of foundry work for ten years, to my personal knowledge. I was connected with the development of one such about five years ago, incidentally studying and discarding the identical type which you describe, and have but recently completed a foundry for a prominent concern, equipping it with a complete continuous apparatus, which is the second they have in use.

The chief objection to the system which you illustrate is its lack of elasticity in almost every essential feature. In the matter of time, the operations are so close together that a stoppage of one for any reason, immediately affects the whole. There is thus no, what may be called, "elbow room." The work should be articulated or divided into groups of operations, each group to be carried on independently of the others, yet touching at certain correlated points. By doing this, the stoppage of any operation by accident or other cause will not immediately affect the others, and a greater average product will be the result. It would be interesting to know the average loss of working time on this apparatus. Not only this, but the influence of an articulated system will be always toward greater speed of production, while with such an apparatus as the Sherman, the increase of speed in some certain operations will not permit the whole system to benefit by the gain apparently available. This is immediately apparent in the speed in which it is said that the Sherman apparatus works. It is stated that the complete cycle of one flask is one and three-quarter hours, while from an inspection of the apparatus it is seen that the cooling takes place over but twenty-five percent of the cycle, with the flasks apparently dead for another twenty-five percent. Since the cooling is the longest operation, with a separate cooling and pouring conveyor, therefore the whole cycle should be but twenty-five percent of one and three-quarters hours, plus the time necessary to complete one mold, with a consequent saving in investment in flasks and chills.

The number of molds per operative is also low. I believe that with such a system as I have in mind, it should be not less than fifteen, instead of the ten which we deduce from the fact of three hundred and fifty wheels being turned out by thirty-five men, while with an automatic ramming device, it should be eighteen and probably twenty per operative.

The matter of destruction of molds by vibration and shaking is, I am convinced, very much of a bugbear. In the apparatus with which I was identified, making very thin castings of considerable length, with a long core fixed at one end only and supported for the most part by chaplet points of not larger than No. 12 wire, I have personally shaken the carriage on which the molds were mounted, as violently as possible, while it was being poured, bringing it with a violent shock against stops, and continued such shaking until the iron had solidified, and yet found casting after casting which had been subjected to such treatment, in perfectly good condition so far as all commercial tests were concerned.

The sand conveyors on the Sherman apparatus are of very unsatisfactory form. The idea of starting and stopping a mass of such sticky material as molding sand, a number of times per minute, should be repugnant to a mechanic when means are available for handling it by carrying instead of dragging it. Not only that, but such intermittent conveyors do not lend themselves at all well to the use of such a continuous system. The sand apparatus of a continuous system should be capable of operating entirely free of the rest of the apparatus; of being filled or emptied at will; of returning its own surplus sand to the reservoir wherefrom the sand is supplied; and of regulation by reducing the amount of sand to be handled where the full production of the plant is not required. I may do the Sherman apparatus an injustice, but it seems to be very deficient in much that comprises an up-to-date sand system.

I would mention in passing, that the average wage on the apparatus with which I was connected was $1.43 per day, against $2.40 for the Sherman device.

G. K. Hooper.

New York, N. Y., Feb. 4, 1905.

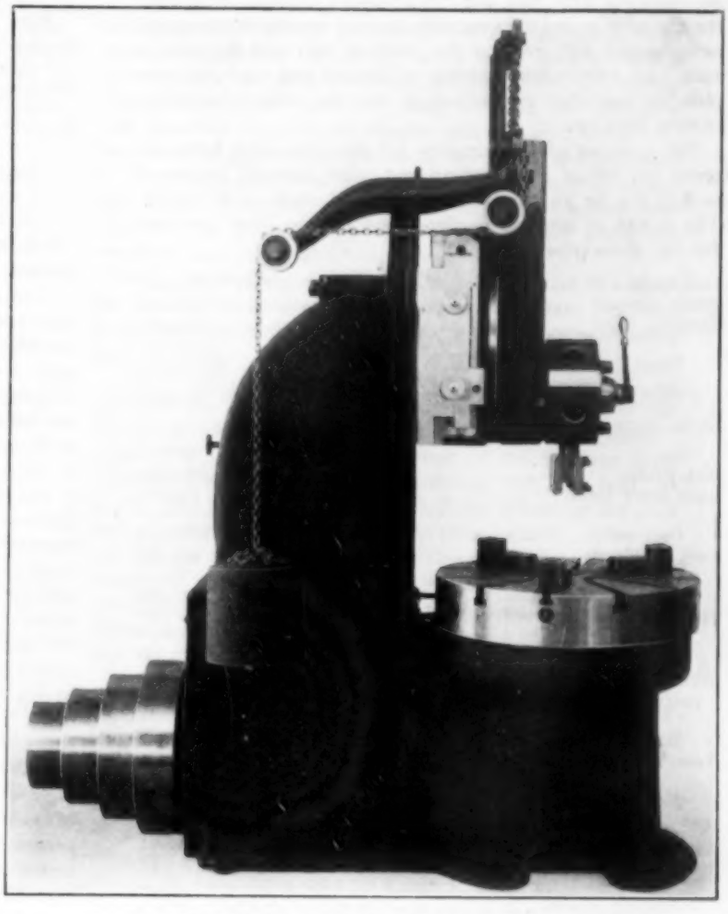


FIG. 2.—ANOTHER VIEW OF NEW BORING MILL.

The annual convention of officers and branch managers of the Crocker-Wheeler Co. took place at the main office and works, Ampere, N. J., January 26, 27 and 28. Managers and representatives were in attendance from all parts of the country, and were unanimous in predicting a prosperous season during the coming year in the field of alternating current generators and direct current generators and motors. On the evening of the 27th a banquet was held at the Cafe Martin in New York, at which the president of the company, Dr. Schuyler Skaats Wheeler, presided.

CHICAGO PNEUMATIC TOOL CO.'S REPORT.

President Duntley states that the directors of the Chicago Pneumatic Tool Co. have decided to begin the regular payment of dividends again at the end of the present quarter, with every probability that they will be maintained steadily in the future. President Duntley said that while no action was taken on dividends at the meeting held a few days ago in the East, the board was agreed that regular quarterly dividends should be resumed in April, probably at the rate of 1 percent quarterly, or 4 percent per annum.

The annual report of the company for the fiscal year ended Dec. 31, 1904, just issued shows on the whole a good year for the company, considering the depression existing in the iron and steel business during the greater part of the year. Net profits for the year amounted to $470,579, a decrease of $230,885 over those of the previous year. Owing to the fact that no dividends were paid and extraordinary expenses were less, the company ended the year with surplus earnings of $195,324, as compared with nothing the previous year and $113,706 in 1902. An extraordinary charge of $55,000 was made to complete the new plant in Scotland, so that the company's surplus is now $254,030.

The earnings of the company for the year, after bond interest but before sinking fund and other charges, amounted to $355,579, or 5.9 percent on the capital stock of $6,113,800. The record of interest, dividend, and sinking fund payments for the three years follows:

Dividends	$815,242
Bond interest	345,000
Sinking fund	150,000
Total	$1,310,242

Following are the figures of financial operations for the past three years:

	1904.	1903.	1902.
Net profits	$470,579	$701,464	$897,059
Less bond interest	115,000	115,000	115,000
Balance	$355,579	$586,464	$782,059
Less dividends	.....	361,079	453,263
Balance	$355,579	$224,485	$328,796
Sinking fund reserve	50,000	50,000	50,000
Balance	$305,579	$174,485	$278,796
Written off for depreciation, repairs, and renewals	85,888	118,213	165,089
Balance	$219,691	$ 56,272	$113,706
Reserve for bad debts, etc.	.....	11,116	.....
Balance	$219,691	$ 45,155	$113,706
Written off for extraordinary and other legal expenses of patent suits, for developing new lines of tools, and for cost of consolidating plants	24,367	45,155	.....
Surplus for year	$195,324	.....	$113,706
Previous surplus	113,706	113,706	.....
Total surplus	$309,030	$113,706	$113,706
Written off for building of Frazerburg plant, in Scotland	55,000	.....	.....
Surplus carried forward	$254,030	$113,706	$113,706

BALANCE SHEET.

The balance sheet as of Dec. 31, 1904, shows an excess of quick assets over quick liabilities of $1,108,602. Following are the figures, with comparisons:

ASSETS.

	1904.	1903.	1902.
Real estate, buildings, plant, machinery, patents, good will	$6,343,118	$6,344,206	$6,506,009
Capital stock other companies and other investments at cost	1,216,109	1,119,125	1,096,926
Cash in bank and on hand	174,192	120,789	212,108
Accounts and bills receivable —less reserves	551,831	578,286	595,537
Inventories of materials, finished work, and work in process	541,521	532,888	442,217
Suspense account	.....	.....	36,804
Sinking fund investment	177,100	120,875	.....
Total assets	$9,003,874	$8,816,171	$8,889,600

LIABILITIES.

	1904.	1903.	1902.
Capital stock issued	$6,113,800	$6,032,900	$6,031,600
First mortgage bonds issued	2,300,000	2,300,000	2,300,000
Interest accrued on bonds and dividends unpaid	61,525	103,831	178,931
Accounts and vouchers payable	94,716	127,864	172,598
Sinking fund for redemption of bonds	177,100	120,875	50,000
Reserves for taxes and suspense items	2,701	16,954	42,764
Surplus	254,030	113,706	113,706
Total liabilities	$9,003,874	$8,816,171	$8,889,600

President's Report.

President Duntley said in his annual report to the stockholders:

"The general industrial depression which occurred during 1903 and continued during the first three-quarters of 1904, caused a natural decrease in demand for our tools and equipment, with a corresponding reduction in the earnings of your company. With the improved trade conditions during the past quarter the demand for our tools and equipment has increased until our factories are now running to their full capacity in order to supply the demand. To meet foreign conditions it was deemed advisable and necessary for the Consolidated Pneumatic Tool Co., Ltd., of London, to establish a new manufacturing plant at Frazerburg, Scotland, and where should be concentrated all that company's manufacturing operations. The plant has been completed and is now in operation. There has been appropriated on account of the building of the Frazerburg plant, out of the surplus of your company, the sum of $55,000, the entire balance of the cost having been paid out of the profits of the Consolidated Pneumatic Tool Co., Ltd. Your company, being owner of the entire capital stock, will receive the benefit of its earnings.

"During the year we have developed and broadened our lines of tools and compressors and have introduced a line of rock drills. Also, we have organized an electrical department for the introduction of electric drills, with the intention of covering a field which has not heretofore been reached with air tools. The demand for electric tools, both in this country and abroad, is most encouraging, and at the present time we are unable to fill our orders for such tools.

"Your company received the only gold medal, being the highest award for pneumatic tools at the St. Louis exposition. We also received a gold medal on our new type of compressors.

"Your attention is called to the showing of quick assets amounting to $1,263,372, against which are current liabilities of $158,943, which includes accrued interest on bonds. The excess of current assets, amounting to $1,108,602, shows an increase of over $450,000 since your company was organized, Jan. 1, 1902, notwithstanding liberal appropriations for improvement work and on account of the Frazerburg plant.

"The company during the period of serious depression has demonstrated its ability to improve its physical property, better its financial condition, meet all of its fixed charges, and place a substantial amount to the credit of its surplus account."

PERSONAL.

Major Hugh J. Gallagher, general staff, U. S. A., who was detailed by direction of the president for service with the Isthmian Canal Commission, assumed the duties of purchasing agent of the commission Feb. 1, with headquarters in the Washington office of the commission. Major Gallagher has had wide experience in purchasing supplies for the army and is regarded at the War Department as one of the best informed and most efficient purchasing agents in the country.

S. K. Behrend has resigned his position as general agent of the Power & Mining Machinery Co., Milwaukee, and will take a similar place with the Independence Smelting & Refining Co., of Denver, Col.

Edw. L. Harrison, who, for the last fifteen years, has been connected with the Niles-Bement-Pond Co., has become connected with the Vandyck Churchill Co., New York.

J. Leon Replogle, superintendent of the forge and axle department of the Cambria Steel Co., Johnston, has been appointed an assistant to Herbert H. Weaver, assistant to the general manager, succeeding in that position Walter S. Weaver. Mr. Replogle still retains his position in the forge and bolt shops and has appointed as his assistant John C. Fox of the Gautier department.

E. L. Byron, who for the past 20 years has been connected with the Vulcan Iron Works Co., Toledo, O., has been promoted to the position of general manager. This does not mean that Alexander Backus will retire from that place, but that Mr. Byron will take much of the responsibility that has hitherto rested on the shoulders of Mr. Backus.

James I. Webb has been elected president and treasurer of the Mt. Carmel Boat Co., Mt. Carmel, Pa., succeeding the late Willis E. Miller.

Frank B. Thompson, assistant auditor of the Carnegie Steel Co., Pittsburg, has been appointed auditor of the American Bridge Co.

Imperial Steel Co. Organized.

It is now practically assured that the plant at Mt. Vernon, O., built by J. S. Coxey and operated for several years by the Coxey Steel & Silica Sand Co., will soon become again a scene of activity. The plant was placed in the hands of a receiver in September, 1902, as was also the sand quarry of the company, at Massillon, O. H. N. Hills, of Gambier, O., who purchased the property from the receiver a few weeks ago, has practically completed the organization of the Imperial Steel Co. of Mt. Vernon, which will own and operate the plant. Capitalists and also men of practical experience in the making of steel castings will be interested in the new company. The quarry near Massillon has an average annual output of 20,000 tons of sand, and the net profit for a number of years was $30,000 per year. The sand of this company is used extensively by steel manufacturers of the country. The steel plant at Mt. Vernon is located on 38 acres just outside the city limits. The main building is 515 x 175 ft. with three runways for electric traveling cranes running the entire length of the building. There is one 15-ton open hearth furnace and one 25-ton open hearth furnace. In the second building, which is 65 x 165 ft., are the offices, machine shop, pattern shop and electric power plant. The entire cost of the plant was more than $400,000. The furnace capacity for steel castings is about 70 tons per day.

The Bessemer Foundry & Machine Co., and the Union Car Wheel Co. have been incorporated under Delaware laws by foundrymen of Pittsburg. The Bessemer foundry has a capital of $50,000 and the incorporators are J. K. Neagley, D. B. Neagley and L. E. McKain. The Union Car Wheel Co. will erect a plant for the manufacture of gray iron car wheels and will have a capacity of about 250 a day.

OBITUARY.

Driven to melancholia by failing health and by his wife's illness John B. Scully, a well known steel jobber of Chicago, committed suicide February 3. His cares, rendered unbearable by nights of sleeplessness and several months of sickness, were ended in a lonely corner of Humboldt Park with a revolver shot through the right temple. Mr. Scully was 50 years old and prided himself that his fortune was selfmade. Although thrown upon his own resources when very young, he has for some years been rated as wealthy. The Scully Iron & Steel Co. was established by A. B. and John B. Scully 12 years ago. They were successful from the start and the business developed rapidly. The progress of the company was directly attributable to the energy and tact of the brothers.

Mr. Scully was always modest and retired, exceedingly industrious and with a reputation for kindness, honesty and integrity established everywhere. In fact, it was his unremitting attention to his business duties that was in a large measure responsible for the act which took his life. While never making any effort to enter into public life, Mr. Scully had frequent opportunities of doing so. He was always a contributor to every known charity, and was well known for his excessive generosity. He was a man loved and respected by his friends and business associates, and his sudden demise has caused universal sorrow. He leaves a widow and daughter, the former being at present in a very precarious condition as a result of a long illness.

Helge G. Forsberg, well known business man of Washington, D. C., died suddenly January 28, aged 60 years. He was senior member of the firm of Forsberg & Murray, machinists and founders.

John A. Weimer, head of the Weimer Machine Works, of Lebanon, Pa., died Feb. 5. He was president of one of the best known blowing engine and cinder car firms in the state.

Major W. F. Goodspeed, president of the Buckeye Steel Castings Co., Cleveland, died suddenly Feb. 4, aged 70 years. Major Goodspeed made a brilliant record in the civil war as commander of Goodspeed's Ohio battery. After the war he was engaged in business in Cleveland for a number of years and was United States marshal from 1876 to 1884. In 1901 he organized the Buckeye Malleable Iron & Coupler Co., whose name was changed in 1904 to the Buckeye Steel Castings Co.

Harrison H. Taylor, inventor of a water tube marine boiler that has been adopted by the United States Government and a number of successful mechanical appliances, died Feb. 4 at his home in Detroit.

Edward Hemphill Mullin died Jan. 25 at his home in Milburn, N. J. Mr. Mullin was born in Castlederg, Ireland, in 1859. After graduating from Queen's College, Belfast, in 1881, he came to New York and engaged in newspaper work. During the next seven years he was on the staff of several well known New York publications, and was a liberal contributor to the technical press on electrical and engineering subjects. In 1898 he became manager of the advertising department of the General Electric Co., with which firm he was connected at the time of his death. He was the authorized representative of the company in its relations with the press and with foreign engineers and capitalists who desired to visit its works.

Some internal troubles have recently disturbed the newly organized Peoria Steel & Tool Co., Peoria, Ill., but matters have been straightened out and it is now announced that the plant will be erected and the enterprise carried to completion as originally planned.

Orders have been issued to operate the 48-in. universal mill of the Carnegie Steel Co., at South Sharon, Pa. This mill has been idle for over a year.

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FEBRUARY 9, 1905

EARNINGS OF THE CORPORATION.

In advance of the detailed annual report of the United States Steel Corporation, which may not be made public long before the annual meeting in April, it is possible to present a summary of the year's operations compiled from the quarterly reports which have been currently submitted. In a way this presentation, which is given below, throws more light upon the year's history than do the customary annual reports, since it presents the figures by quarters, and thus permits a more careful study by comparison with the conditions in the iron trade as they existed.

Statement of United States Steel Corporation for year 1904, compiled from quarterly reports:

Net earnings after deducting monthly expenditures for ordinary repairs, renewals and maintenance of plants, also interest on bonds and fixed charges of subsidiary companies:			
January	$2,868,213		
February	4,540,673		
March	5,800,000		
Quarter		$13,208,886	
April	$6,863,833		
May	6,256,518		
June	6,370,374		
Quarter		$19,490,725	
July	$6,344,771		
August	6,202,957		
September	6,226,204		
Quarter		$18,773,932	
October	$7,250,204		
November	7,117,418		
December	7,091,112		
Quarter		$21,458,734	
Year			$72,932,277
Less appropriation for the following purposes:			
Sinking funds on bonds of subsidiary companies:			
First quarter	$227,867		
Second quarter	469,425		
Third quarter	417,883		
Fourth quarter	468,967		
Year		$ 1,584,142	
Depreciation and reserve funds:			
First quarter	$1,717,778		
Second quarter	3,059,062		
Third quarter	3,800,317		
Fourth quarter	3,916,160		
Year		$12,493,317	
Total			$14,077,459
Balance			$58,854,818
Deduct:			
Interest on U. S. Steel Corporation bonds:			
First quarter	$5,802,942		
Second quarter	5,867,175		
Third quarter	5,925,325		
Fourth quarter	5,922,850		
Year		$23,518,292	
Sinking funds, U. S. Steel Corporation bonds:			
First mortgage bonds	$3,040,000		
Second mortgage bonds	1,010,000		
		$ 4,050,000	
Total			27,568,292
Balance			$31,286,526
Preferred stock dividends: 1¾ percent or $6,304,919 quarterly			$25,219,676
Surplus or deficit:			
First quarter deficit	$1,857,120		
Second quarter surplus	2,777,644		
Third quarter surplus	1,312,988		
Fourth quarter surplus	3,833,338		
Net total surplus			$ 6,066,850
Add for adjustments to figures for first three quarters after their current presentation			158,794
Corrected year's surplus			$ 6,225,644
Less, net charged off for employes' bonus funds, for adjustment of inventory valuations and sundry accounts			1,135,029
Balance undivided profits (held subject to appropriation for payment of construction and capital obligations)			$ 5,090,615

In studying any presentation of earnings of the United States Steel Corporation it must be borne in mind that they are not the figures which would be presented by an ordinary corporation. Owing to its peculiar makeup and the system of accounting adopted, the steel corporation deducts, before arriving at "net earnings," the interest paid on some $115,000,000 of bonds of subsidiary companies, yet awaits the arrival of net earnings before making deductions for sinking funds against these same subsidiary bonds. As the subsidiary bond interest amounts to not less than $5,750,000, the real earnings of the corporation were not $72,932,277 for the year, but about $79,000,000. Accordingly, the balance of undivided profits at the end of the year, $5,090,615, constituted only 6.4 percent of the total earnings, while depreciation, sinking funds, interest and dividends involved more than 93 percent. Such a proportion is not usually regarded as permissible with a manufacturing company. Even on the assumption that the various reserve ac-

counts are ample, the proportion cannot be considered otherwise than as disquieting, but reasons will be mentioned later for asserting that such an assumption is not justifiable. It is doubtless the fact that when it became apparent in the last quarter of 1903 and the first quarter of 1904 that the earning rate had dropped so greatly, there was a strong faction in the directorate in favor of either passing or reducing the preferred dividend, and that it was only on the expectation of a large increase in earnings that the dividend rate was left undisturbed. That these hopes were scarcely justified is apparent. There was a substantial increase in the second quarter, but the third quarter showed a slight decrease from the second, and the fourth only a slight increase, yet the third and fourth quarters were helped largely by the earnings of the ore roads at the head of the lakes, which had earned little in the first two quarters, and will earn practically nothing in the present quarter, which, not having this aid, can hardly show any great increase in earnings, so that altogether the realization of the increased earnings on which the continuation of the preferred dividends was presumably based, is still quite in the future. Full credit was given to the management when, at an early stage, the decision was reached not to resume common dividends until a large surplus had been accumulated. There would have been little ground for criticism if the same policy had, at a later time, been adopted with regard to the preferred dividends.

The assumption on which the above remarks are based, that the various reserve accounts are ample, is, nevertheless, not quite clearly tenable. They can be referred to *seriatim*.

The sinking funds on bonds of subsidiary companies were contributed to in 1904 to the extent of $1,584,142, yet the total of these bonds is about $115,000,000, the percentage being less than 1.4 percent. As these bonds are really the first liens on various properties, and thus amply protected, it would do no harm to recognize the nature of the obligation. Furthermore, the Union bonds are by their indenture made to carry a sinking fund of 2 percent, say $740,000, leaving some $844,000 for the remaining $77,000,000 of subsidiary bonds, yet more than $25,000,000 of them fall due within the next ten years. Where $844,000 was appropriated in 1904, it is obvious that an average of close to $3,000,000 annually must be appropriated in the following ten years.

The question of depreciation and reserve funds may be dismissed with the remark that the allowance in the first quarter, being less than half the average of the following three quarters, was presumably so made in view of the large deficit which that quarter showed, since it was a quarter in which a very large number of blast furnaces, blown out shortly before, were put in blast again, an operation hardly conducive to longevity. The year's total is less than one percent (0.85) of the corporation's total capital obligations.

The sinking funds against the first and second mortgage bonds of the corporation are those which the nature of the indentures requires, being one percent on the first mortgage bonds and $1,010,000 on the second mortgage bonds, or about 0.4 percent on the total authorized issue. These bonds are open to the criticism that none are retired until the whole issue is retired; the sinking fund appropriations are merely used to purchase bonds, which continue to draw interest for account of the sinking fund; otherwise these small amounts could not retire the bonds at the end of their natural life. The safer form of bond issue is that in which definite portions are retired and canceled annually, thus steadily reducing the interest charge. With the steel corporation's bonds, the full interest charge remains until maturity.

Altogether, it can be frankly said that the hopes of the United States Steel Corporation must depend, not upon the showing made for the year 1904, or even for the year's closing quarter, but upon a further improvement in its business.

THE INJUNCTION PRINCIPLE.

In its recent decision in the so called beef trust case, the United States supreme court used language which has been construed by some newspapers as a sweeping denial of the power to issue an injunction to prevent strikers from performing illegal acts. It seems to us clear that this conclusion is not justified. Judge Grosscup, in the injunction which the supreme court has just sustained, restrained the accused packers from taking part in or performing any contract, combination or conspiracy, the purpose or effect of which would be to restrain trade between the states or to violate the Sherman anti-trust law of 1890. The supreme court commented as follows upon this phase of the case:

> We are bound by the first principles of justice not to sanction a decree so vague as to put the whole conduct of the defendant's business at the peril of a summons for contempt. We cannot issue a general injunction against all possible breaches of the law. We must steer between these difficulties as best we can. The general words of the injunction, "or by any other method or device the purpose and effect of which is to restrain commerce as aforesaid," should be stricken out of the injunction. The defendants ought to be informed as accurately as the case permits what they are forbidden to do. Specific devices are mentioned in the bill and they stand prohibited. The words quoted are a sweeping injunction to obey the law, and are open to the objection which we stated at the beginning it was our duty to avoid.

Applied to a strike, this decision would mean that while the court could neither issue an injunction which would prevent a union from existing nor an injunction which would name all possible infractions of the law, the court could steer between the two extremes and issue a mandate which would be reasonably specific and prevent violations of the law while not attempting to interfere with the legitimate objects of a union. This decision will have the effect of making the courts more careful in their choice of words, but it furnishes no comfort for those who would resort to violence. On the contrary, it sustains the principle of injunction.

The Labor Situation.

PRESIDENT COULBY ON THE LABOR PROBLEM.

"The Relationship Between Capital and Labor" was discussed before the members of the Builders' Exchange at their quarterly meeting, Feb. 6, at Cleveland, by Harry Coulby, president of the Pittsburg Steamship Co.

He spoke of the relationship between employer and worker as being one of the most important problems of the day and said that it was best to view it on the broad ground of what is best for the general public, which includes both the employer and the employe. He expressed the belief that oppression and bad treatment of the worker were largely responsible for the birth of unionism and, such being the case, the employer must assume some responsibility for the conditions now existing. The most serious objections he found to the unions were, he said, the walking delegates, the denial of the right of giving employment to men who do not belong to the organization, and the arbitrary position they sometimes take of stopping or delaying work because of violation of union rules by other organizations.

The right of the worker to organize for the betterment of his condition must be recognized, Mr. Coulby declared, and he held that just so long as the workers, through their organizations, confine themselves to endeavoring to better their conditions without interference with the rights of the employer and are satisfied to recruit their ranks without the use of coercion, the general public will tolerate them without any interference. He said that he believed one of the things that has contributed largely to the development of unions has been that the employer has kept too much aloof from his men, thus permitting abuse and ill treatment to be practiced by his subordinates of which he had no knowledge. He added that some of the largest employers of labor in the country have attributed their freedom from labor troubles to the policy of keeping in personal contact with their men and stimulating in all possible ways the confidence of the men in the management.

In closing, Mr. Coulby said: "The general public is vitally interested and is keenly watching the progress of the settlement of this question, and upon good, sound business principles let us all put forth our best efforts in creating harmony and in being absolutely fair and just in all our dealings with the workers, so that we may at all times court the investigation of the general public, whether it be through the public press, the Civic federation or any other avenue they may elect. "If unionism should become a serious obstacle to our development the public will condemn it. Already there is a growing sentiment in favor of the 'open shop,' which, after all, appeals to me as the only American twentieth century solution of the question. Let us not act hastily. Be sure we are absolutely fair and right in any position we may take. If dealings with unions and through trade agreements should eventually prove to be dwarfing our development you will find the open shop idea correspondingly increased in strength and the public will demand which is best for all the people."

UNION OF MATES FORMED.

It is announced that the officials of the Longshoremen's Association have organized some of the mates on the lakes into a union to be known as the Lake Pilots' Protective Association. The organization is certain to meet much opposition from the vessel owners. President William Livingstone, of the Lake Carriers' Association, states that no pilots' union will be recognized by the lake carriers. General Manager Coulby, of the Pittsburg Steamship Co., states positively that no union mates will be employed. Mr. Coulby and other fleet managers take the position that as mates are frequently promoted to be captains and as it is the policy of the company to make such promotions, it will be very undesirable to have the mates belong to a union when captains are not allowed to do so.

LEAGUE OF LABOR BUREAU SECRETARIES.

To assist in furnishing workmen from one city to another is the principal object of the newly organized League of Labor Bureau Secretaries. At a recent meeting in New York, there were present, besides the secretaries of 11 labor bureaus, about 25 representatives of manufacturers' associations, some local and some national, representing a membership probably of from 1,500 to 2,000 industries, employing about 1,500,000 persons. A constitution was drawn up and the following officers elected: President, H. C. Hunter, of New York; vice president, S. D. W. Cleveland, of Syracuse; secretary and treasurer, H. S. Hastings, of the Worcester Metal Trades' Association; executive committee, D. H. McPherson, of the Manufacturers' Association of Philadelphia; H. W. Hawley, of the Manufacturers' Association of Bridgeport, Conn.; W. C. Gentry, of the Pittsburg Manufacturers' Association, and A. E. Corbin, of the Hartford Manufacturers' Association.

THE ANTI-INJUNCTION BILL.

The Worcester Metal Trades Association has communicated with every member of the Judiciary Committee at Washington, protesting against the Jenkins Anti-Injunction Bill. In answer to the communication, Samuel L. Powers, the Massachusetts Congressman on this Committee writes: "I am opposed to the bill in its present form and have reason to believe that it will not receive favorable consideration at the present session of Congress." Marshall Cushing, Secretary of the National Association of Manufacturers, states that the members on this committee received basketfuls of telegrams and letters from all over the country, protesting against the measure.

STRIKE MAY SOON END.

Unless the strike of the Amalgamated Association existing at the Youngstown and Girard, O., plants of the Carnegie Steel Co. is soon declared off, there promises to be a general desertion from the ranks of the association by the present strikers. The men are dissatisfied and declare that the strike can be declared off without involving the Amalgamated Association in scale differences with other mills that have signed the present scale. The puddlers at the Youngstown plants of the Carnegie Steel Co. are paid more than the present scale calls for and most of the other scales are special and apply to this mill alone. A conference between the Carnegie officials and a committee of the strikers was held last week and as a result demands have been made by the men that the strike be declared off. If the Association officials refuse, the majority of the men will endeavor to return to work, and as most of the places at the Youngstown, O., plants have been filled, it is probable that the Girard, O., plant will be placed in operation by the first of next month.

METAL TRADES ASSOCIATION NOTES.

Commissioner Eagan returned to Cincinnati from an extended eastern tour on the morning of the 7th, and will remain at the home office some weeks in completing preparations for the convention which will be held in Chicago, March 23 and 24. From the interest evidenced by the members, the convention will undoubtedly be largely attended.

The executive committee of the St. Louis Metal Trades Association held its regular monthly meeting on February 7. These meetings are held at regular intervals to enable the members to bring up any matters which may be of importance. The labor situation in St. Louis is more quiet than for some time.

At a meeting of the various local unions of Philadelphia

affiliated with the National Association of Machinists held on January 30, it was decided to institute a vigorous campaign for the enforcement of a minimum rate of $15 per week of 55 hours.

The Cincinnati Metal Trades Association has issued invitations for its quarterly meeting and dinner which will be held on Thursday, February 9, at the Business Men's Club. Among the speakers will be Robert Wuest, secretary of the National Association, and J. M. Manley, the newly elected assistant secretary of the local Association.

The Plan and Scope Committee of the N. M. T. A. consisting of Messrs. W. D. Sayle, of Cleveland; C. E. Hildreth, of Worcester, Mass.; F. K. Copeland, Chicago; F. A. Falkenau, of Philadelphia; O. B. Kinnard, of Minneapolis, and ex-officio members H. N. Covell, of Brooklyn, N. Y., and Commissioner Eagan will hold the final meeting on February 17 and 18 at the New Willard in Washington, D. C., to formulate the working out of plans which this committee has in charge for the merging of the various local metal trades associations into the national association. The plan adopted at this meeting will be presented to the convention of the association in Chicago for final action.

A movement is on foot in the N. M. T. A. to establish a social organization consisting of the past officers and members of the administrative council for the purpose of insuring a continuance of the friendly relations established in the work of the association. It is intended that a dinner be held the evening before the opening of each annual convention to be participated in by these past officers. It has been suggested that this dinner be called the alumni dinner. At this time about forty members of the association are eligible to participate in this dinner.

BONUS FOR CORPORATION EMPLOYES.

Fully 5,000 employes of the United States Steel Corporation will participate in the distribution of the cash bonus of about $1,000,000, which the directors of the United States Steel Corporation have decided to distribute to certain of its employes—a larger number of beneficiaries than was at first supposed. The men who will get the bonus will include heads of departments, foremen, clerks, furnacemen, and extending down well into the classes of the skilled workmen. If the sum was divided equally between all each man would receive about $200, but the division will be pro rata, based on the salaries received by each.

The American Smelting & Refining Co. has also adopted the plan of a cash bonus to efficient employes. Its action followed the receipt of an answer by Andrew Carnegie to an inquiry by officers of the company as to the best way to get the employes interested in the business of the company and in their special branches of business. The reply was: "Let them participate in the earnings of the company, then they feel that they are not only salaried men, or wage earners, but that they are in reality co-partners and that everything they do for the company they also do directly for their own benefit."

At the recent annual meeting of the stockholders of the Guerber Engineering Co., Bethlehem, Pa., the following directors were elected for the ensuing year: Wm. B. Myers, Chas. M. Dodson, A. N. Cleaver, Jos. W. Adams, F. C. Stout, Robt. H. Sayre, Owen F. Leibert, J. A. Eberts, P. A. E. Guerber. The directors elected the following persons as officers: A. N. Cleaver, president; Owen F. Leibert, vice president; J. E. Boatrite, manager; P. A. E. Guerber, superintendent; Wm. B. Myers, treasurer; F. H. Brunner, secretary.

No. 1 blooming mill of the American Steel & Wire Co., at Newburg, Cleveland, has recently been establishing new records for tonnage. During January 47,980 tons of finished 4 x 4 billets were rolled. This is a new record and an increase of 6,000 tons over the mill's best previous monthly tonnage.

LAKE SUPERIOR IRON MINES.

Pickands, Mather & Co., have decided to resume operations at their Troy mine on the Mesabi. Preparations are now being made to unwater the property. When closed on May 31, 1904, the Troy had 11,000 tons of iron ore in stockpile, which was removed late in the shipping season. The quota of men employed is 100 when both shifts are working.

Work on the Iron range cut through the Fayal mine dump is progressing rapidly. A great quantity of material has been removed since the job was commenced last month. The maximum depth of the cut is 18 ft.

Concerning the death of Chas. H. Cady, which was mentioned in these columns last week, the Iron Mountain Press of Iron Mountain, Mich., says:

"Mr. Cady had a national reputation as a progressive mining man. He came to Iron Mountain in 1883 to accept the general superintendency of the Chapin mine, succeeding his cousin, Clarence D. Cady. At that time the Chapin mine was the property of the Menominee Mining Co., and he was continued in the position when the mine passed to the control of the Chapin Mining Co.—first under the management of the Van Dyke family and later with Ferdinand Schlesinger. Mr. Cady resigned the position of superintendent in October, 1891, —thirteen years ago—and returned to New York state to become general manager for Witerbee, Sherman & Co., at Mineville, N. Y., operators of iron mines, furnaces and railroads, which position he retained until last spring, when he resigned and retired to private life. Mr. Cady was one of the most progressive and intelligent mining men that ever came to the Lake Superior region. It was under his direction that the Chapin mine was largely developed and became the greatest producer of iron ore in the world. D shaft, one of the most difficult engineering problems ever solved in this country, was sunk in accordance with his plans. In sinking this shaft, which penetrates many hundreds of feet of quicksand, the freezing process was used successfully for the first time in this country. He was also instrumental in introducing many labor-saving devices for the mining of iron ore cheaply and expeditiously and his advice was sought in all important mining ventures."

New Records at Duquesne.

During the month of January the fourteen 50-ton open-hearth furnaces of the Duquesne plant of the Carnegie Steel Co., Pittsburg, made a phenomenal production record which eclipsed all previous records made by any open-hearth plant of its size. During this month these furnaces produced 45,720 tons of steel or an average of 3,265 for each furnace. During that month, the plant was operated several Sundays owing to the heavy demand for steel, and this operation contributed to the excellent showing. The best previous record made at the plant was 43,804 tons. The 13-in. merchant mill also established a new record by rolling 10,487 tons of steel during the month, while the 10-in. bar mill also eclipsed its previous record by producing 6,760 tons. The 40-in. blooming mill rolled 34,247 tons of steel while the 14-in. mill rolled 16,775 tons.

The A. D. Granger Co., contracting engineer, with offices in New York and Philadelphia, has opened an office in the Bessemer building, Pittsburg, with E. W. Bentley as resident manager. This company contracts for the installation of engines, boilers, pumps, condensers, tanks and the erection of stacks, together with complete power plant equipment.

The National Founders' Association will hold the semi-annual meeting of its administrative council at the New Willard in Washington, D. C., March 20 and 21.

THE H. W. CALDWELL & SON CO.

The H. W. Caldwell & Son Co., of Chicago, has made a number of additions to the plant since the last catalogue was issued, the main plant being completed in January, 1900. All the buildings are of brick and steel construction and comprise the main machine shop, the Caldwell helicoid conveyor and sheet metal shop, the power house, and the warehouse and shipping building. The main machine shop covers a ground space of 100 x 180 ft. The erecting floor occupies this area and galleries are placed on the three sides. These are commanded by an electric crane of 40,000 lb. capacity and the machine tool equipment of special and standard machines is modern and complete. The Caldwell helicoid conveyor and sheet metal department is housed in a separate structure, 100 x 180 ft. This line of work, a specialty with this pioneer firm, requires a supply of special tools for satisfactory manufacture and has an assortment of tools designed for the rolling of the helicoid flight and the building of the complete conveyor. The power house is 60 x 73 ft. and has a boiler equipment of 350 h. p., the main engine and electric generator for power purposes, the auxiliary direct connected dynamo for lighting, and the air compressor. The plant has an adequate equipment of pneumatic tools. The warehouse and shipping department is in the building most recently added to the plant. This is a three-story and basement structure of modern mill construction. The building contains 45,000 sq. ft. of floor space. A number of halftones illustrate the plant in the latest edition of the general catalogue, No. 28, and also submit much information regarding the product of the company. This includes helicoid conveyors, friction clutches and machine molded gears in particular and a line of elevating, conveying and power transmitting machinery in general. The new catalogue is an elaborate affair with 736 6 x 9 in. pages in cloth binding, the latter bearing a striking design in vivid colors. The contents of the book are not capable of compression in a brief notice with any degree of satisfaction, but this much may be said: The data is admirably arranged, with a good index, and the engineering notes are of a suitable character to insure preservation of the catalogue.

Pittsburg Foundrymen's Association.

At a meeting of the Pittsburg Foundrymen's Association, held at Pittsburg, Monday, February 6, J. S. Robeson, president of the American Glutrose Co., Philadelphia, read an interesting paper on "Core Binders," which is published in this issue of *The Iron Trade Review*. Much information with reference to core making was given and the low percentage in mixtures of some of the binders used was a surprise to many. Most of the foundrymen agreed with Mr. Robeson that the sand for making cores was of first importance, and that the binder was of secondary consideration. While different binders were used by many of those who took part in the discussion, it was generally agreed that for overhanging cores flour must be used as the binder. One of the foundrymen showed a core to the visitors in which glutrine was used as a binder in the ratio of 50 to 1 and even this core was too hard for general practice. The proper proportion in this instance should have been 75 to 1. It was claimed that this substance was used by some of the foundrymen in the ratio of over 100 to 1 with excellent results.

Armor Plate Contracts Awarded.

Secretary Morton on Feb. 7 rejected the bid of the Midvale Steel Co. on the armor plate for the battleship New Hampshire and the armored cruisers Montana and North Carolina, and ordered that the contract be divided between the Carnegie and Bethlehem Steel companies, whose bids were identical. His action was based on the report of a board of ordnance experts who investigated the subject and personally examined the Midvale plant. The Midvale plant, which has just been completed, has the contract for the armor for two battleships, deliveries of which are to begin in July. None of the plates have been subjected to the government test, though two of them have met all requirements at a private test conducted by the government experts. Under these conditions the board concluded that it would not be wise to award another contract to the Midvale Steel Co. until it has proved that it can turn out satisfactory armor at the prescribed rate. The Bethlehem Steel Co. will furnish the armor for the battleship and one of the cruisers, aggregating 5,666 tons. The armor for the other cruiser, amounting to 2,161 tons, will be supplied by the Carnegie company.

The value of the Louisiana Exposition in the promotion of commerce and manufactures is illustrated, in one instance, by the fact that the two large compressors in Machinery Hall, which furnished all compressed air used at the exposition, were both sold before the closing day. The large one goes to shaft No. 3 of the Doe Run Lead Co., at Central, Mo., and the smaller one to the City of Columbia, Mo., for the air-lift water supply system. The firt machine received, the grand prize awarded to air compressors. It has a capacity of 1,300 cu. ft. of free air when running at 125 revolutions, and is distinguished by several novel features, the most important of which is the Cincinnati valve gear, the opening and closing of the admission and the closing of the exhaust being controlled mechanically, while the opening of the exhaust is determined by poppet valves, thus permitting high speed without throttling of the air and wear and rattling of the valves. The smaller machine has mechanically-moved inlet valves and is rated at a displacement of 500 cu. ft. per minute. Its workmanship and operation so much impressed the officials of the City of Columbia that they countermanded an order on another manufacturer. Both machines were built by the Laidlaw-Dunn-Gordon Co., New York.

A new type of magnet for handling pig iron, small billets, scrap iron or steel, small steel or iron castings, bolts, rivets, etc., in bulk, which has recently been put on the market by the Electric Controller & Supply Co., of Cleveland, is the result of long experience and persistent experimenting to get the most efficient design. It is adapted to be carried on the hook of a crane and controlled by the crane man who can thus perform the entire operation of loading or unloading a car, or loading melting stock into charging boxes with no ground helpers. This type of magnet affords means of materially reducing the cost of handling such raw materials and there is a heavy call for it. The design of this magnet is radically new and covered by letters patent.

During the month of January the open-hearth plant of the Carnegie Steel Co., Sharon, Pa., known as the South Works, made a new record for production. The plant contains twelve furnaces and made 648 heats for the total of 35,711 tons. This breaks the plant's previous record by 3,457 tons.

Dissatisfied stockholders of the Omega Steel Co., New Haven, Conn., are endeavoring to have the receiver, Charles Hudson, removed. Pending the hearing of this application the court has deferred its decision regarding the application made by Mr. Hudson for permission to sell the secret steel making process owned by the company.

The Charles G. Smith Co., Pittsburg, dealer in machine tools and accessories, has removed its office to 604 Park building.

EASTERN PENNSYLVANIA.

Harrisburg, Feb. 7.—February has opened with brighter prospects for some localities than for a long time. The conditions about Lebanon, Reading and Harrisburg are reported better and the Lehigh and Schuylkill Valleys are busy. More orders are being placed and barring bad weather the railroad conditions have been good. At Lebanon the Lackawanna Iron & Steel Co. has ordered the starting of its five blast furnaces which have been idle for sixteen months. The Colebrook furnaces will be started first, to be followed by the Cornwalls. Other furnaces in the Lebanon district are to be started. At Sheridan the Berkshire Iron Works will start one furnace soon. This company has recently increased its capital to over $1,000,000.

The state of affairs about Scranton and up-the-state towns is reported good and the continued work of the mines has given plenty of work to small iron and steel concerns. Lancaster county mills are generally at work and the Susquehanna Iron & Steel Co. may start furnaces this spring. In Coatesville, Chester county, the Lukens and Worth companies are making improvements to their plants in the shape of new mills.

The Harleigh Iron Works of Hazleton, has been chartered by the state. This is the only new iron works company to be incorporated this month, but there have been a number of new motor companies, among them the Scranton Garage & Motor Car Co.

The Colonial Iron Co. has started one of its alternate stacks at Riddlesburg, Bedford county. This is the second furnace to start in that part of the Juniata valley within six weeks and more may follow if the iron conditions improve.

The Landis Tool Co., of Waynesboro, has enlarged its force of men and is increasing its shipments, business for the last quarter having been the best ever known.

The Macungie Brass & Iron Co. is running its plant day and night because of rush of orders.

Lebanon ore mining operations are being resumed because of the prospect of starting furnaces. The conditions have also caused several ore mines in Lehigh, Berks and other counties in that part of the state to be resumed. Among them are Rittenhouse Gap and Dunkle mines.

The Lebanon Valley Iron Co. is adding a sixteen inch train to its finishing mill. A new furnace is also being added to increase the output of the mills from 25 to 30 tons a day. H. H. Light has been re-elected president. The Nes Chain Works, of New York, is running more hours a week than for two years. It is taxed with orders.

The Carlisle Body and Gear Works, burned recently, will be rebuilt if present plans are carried out.

The High Duty Saw & Tool Co. has established a works at Eddystone, Delaware county.

Canadian Industrial Notes.

Toronto, Can., Feb. 6.—There is a keen competition going forward between the rival towns of Fort William and Port Arthur, at the head of navigation on Lake Superior, as to which shall receive the blast furnaces, coke ovens and accessory works in connection with the smelting of Attikokan iron ores. The project originally favored Fort William, but Wm. Mackenzie, of the Canadian Northern Railway, which is heavily interested in the enterprise, is disposed to prefer Port Arthur. The Canadian Northern has closed a contract for the location by the Pittsburg Coal Co. of spacious ore docks on the north side of the McIntyre river, within the limits of Port Arthur. Mayor Viger, of Port Arthur, accompanied by D. F. Burk and George T. Marks, were in Toronto this week with a view to having the blast furnaces also located there and had an interview with W. Mackenzie and D. D. Mann of the Canadian Northern. If this proposition is carried out, the works will be located at the south end of the town, south of the McIntyre river.

J. H. Plummer, president of the Dominion Iron & Steel Co., has been for some time laid up with a severe attack of illness at his residence in Sydney, N. S. His brother, Frank Plummer, has been summoned from Toronto. Late reports indicate an improvement in his condition.

The Polson Iron Works, of this city, have been incorporated. The incorporators are: Alex. H. Jeffrey, assistant manager; William B. Tindall, John J. Main, Bessie S. Polson, wife of Franklin B. Polson, and Jessie Miller.

The Defiance Iron Works Co., Ltd., has been incorporated under the laws of Ontario, with head offices at Chatham and a capital of $60,000. The provisional directors are: William S. Marshall, Geo. W. Foott, Lawrence Howard, Morton P. Sheldon, Richard J. Barnes and Wm. M. Drader.

Allis-Chalmers Co. Sales Offices.

The Allis-Chalmers Co. is making important changes in the organization of its sales offices throughout the country. These changes are brought about because of the broadened scope of the company's operations since it acquired the Bullock Electric Mfg. Co., of Cincinnati, which has now become the electrical department. Hereafter, the rule will be that each Allis-Chalmers district sales office will represent all the company's lines of manufacture in prime movers, as well as in saw mill, flour mill, mining, crushing, cement and other machinery and the electrical interests. This policy involves the opening of a considerable number of new Allis-Chalmers offices, and in many places the consolidation with these of the Bullock offices heretofore maintained in the same centers. Some recent changes brought about by following out this policy are as follows:

St. Louis: An Allis-Chalmers district sales office has been opened in the Chemical Building. The Bullock Electric Mfg. Co.'s offices, formerly in the same building have been consolidated with them. H. P. Hill formerly district manager for the Bullock Co., is the manager for the consolidated offices. Cleveland: An Allis-Chalmers Co. district sales office has been established, in the New England building, where the Bullock offices formerly were, and the two offices have been consolidated under the management of Franklin Wharton, formerly district manager for the Bullock Company. Pittsburg: A Bullock office has been opened in the Frick building and consolidated with the Allis-Chalmers office under the management of H. Wiedeman Murray who has for years represented the Allis-Chalmers Co. in that district. Kansas City, Mo.: The Allis-Chalmers Co. has established a new office in the Dwight building. George W. Mattison, who has been connected with the company for a considerable time in other capacities, is in charge. Buffalo, N. Y.: An Allis-Chalmers district office with temporary headquarters in the Ellicott Square building has been opened under the management of George W. Pulver. Mr. Pulver is well known throughout the district of which Buffalo is the center, having been for a number of years with the Westinghouse Electric & Mfg. Co. at its Syracuse office, and acting manager of that office until recently.

The National House of Representatives has passed the Little resolution to investigate the United States Steel Corporation. Representatives of the corporation state that the adoption of the resolution is in no way distasteful to the corporation. It has made a practice since its organization of giving the public nearly all the facts asked for in the resolution.

The American Radiator Co., Chicago, has declared the regular quarterly dividend of one and three-fourth percent on preferred stock and one percent on the common stock.

SOME IMPRESSIONS OF AMERICAN WORKSHOPS.*

BY A. J. GIMSON.

When in America the author visited sixteen engineering workshops situated in cities far distant from one another, and comprising works for the manufacture of steam engines, pumping machinery, shafting and pulleys, machine tools, elevators and valves. Any ideas that may be here set down are of a very general character, for it was not the author's intention to inspect or investigate any special class of work. The works visited ranged from factories at least two generations old, where generally a considerable variety of work was undertaken, to modern workshops of only a few years' growth, where a special class of machine was also manufactured. The very best of these workshops, with possibly one exception, could be matched in equipment and in general methods of carrying out work by single works in this country. Some of them were in no way in advance of ordinary practice here. In general, however, the organization of an engineer's workshop in America struck the author as superior to that in similar works in England, whilst in some the organization was in every detail admirably thought out and administered. In a modern business an American begins to make one particular machine or particular kind of machine. His whole energy is, in the first instance, concentrated upon making this machine superior to anything at the time upon the market. More than with us, he thinks that natural ability is aided by the best scientific knowledge in the design of the machine to be produced.

A feature of the engineering industry that impressed the author was the close intercommunication of technical institutes and manufacturing workshops, of professors and manufacturers, and the presence, in minor positions of authority, of young men who had passed through a complete course of technical instruction. The American employer gives one the impression of being a firm believer in the merit of the machine he is manufacturing. Doubt is eliminated from his mind, and he can enter whole-heartedly into the processes of manufacturing his particular article without a fear that it may not meet the needs of his customer. His confidence is based on a very complete knowledge of his subject, and not upon an overexalted belief in his own special ability. When the actual making of the machine designed comes to be undertaken, it is essential that accuracy and economy of production shall be attained. Methods were observed for obtaining accurate machine work, and methods of testing the accuracy of machines as they were being put together, which were admirable in their approach towards perfection. No detail is too trivial to be well thought out, and the tests are such that their object is attained without needing any considerable expenditure of time on the part of the workman. . Although he did not remember having seen any workmen exerting themselves more than is usual in shops here, the author is convinced more work is obtained from them by the close study of economies by the staff in the drawing and allied offices.

An American employer will see that his workmen have no reason to use their time for any purpose in which they are not skilled. His foremen will do no clerk's work. His machine men will not be grinders of tools nor designers and constructors of methods for holding and machining the work. A machine minder's business is to keep his machine moving and his tools cutting every minute of the day that is possible. It is relegated to others to design, to grind, to fetch and carry his tools, to prepare chucks, jigs and everything requisite, so that they may be ready to the workman's hand at the time they are wanted; and to his foreman is relegated the chief duty of seeing that the work is quickly and correctly done. It would be instructive to some here to know what proportion of the time of a factory's running is used by any given machine in actually performing the work it is designed to do. The author has seen a works where every separate job for every machine is ordered and arranged from the office staff, where every detail in the process of its machining is settled, and the number of minutes each process must occupy is displayed before the article reaches the workman's hands. In such a works a liberal bonus is paid for a saving in time, and rigorous methods are in force against those who fail to carry out the work in the stipulated time. Such methods may appear harsh, but he believes that in practice they are not so, for they are the result of accurate experience gained by an expert staff, and they recognize the enormous difference, in industry and ability, that there is between different workmen. The able man is allowed full pay for his ability, and is rewarded by a very great increase in money earned over his slower or less industrious neighbor. In the same way, by card processes, by clocks with dials divided into tenths and hundredths, are minutes saved which a workman uses in calculating his time, and which a clerk wastes in complicated addition and multiplication of figures. Persistent energy and patience have achieved remarkable results in the organization of cheap production in some of these workshops. This, the author thinks, is the chief difference, stated in general terms, between English and American workshop practice. In this country they are somewhat wasteful of the workmen's time; in America they are careful of it to a remarkable extent. It follows that if American engineers shall compete successfully against English engineers, it will be, in his opinion, because the organizers of their business know their work, and carry it out better than do the organizers of business here. Their workmen are in no way superior, but their skill and ability are used to better advantage.

In matters of design, as distinct entirely from methods of manufacture, he did not note great differences between American and English practice. On both sides of the Atlantic the same problems are attacked on similar lines: in details they differ, but not in principles. It would seem that there is much to be learned from each other in these things, and that the more friendly rivalry there is between the engineers of the two nations, the better will it be for the engineering industry of the world. The author believes that no one who visited America with this institution can fail to have been impressed with the cordiality with which they were received, and the exceeding trouble which was taken to make their visit interesting, instructive and pleasant; and he entertains a grateful remembrance of their hospitality.

*Read at meeting of the Institution of Mechanical Engineers, Jan. 20, 1905.

The Oregon Iron & Steel Co., Portland, Ore., has for a second time won a suit involving the ownership of a large meteorite whose possession was claimed by several persons. In instructing the jury the court held that while the meteorite came from without the world and was the property of no one, still it was to be considered the gift of God to the man on whose property it was deposited. The discovery of the meteorite was made by two prospectors, Ellis Hughes and William Dale, in the autumn of 1902, and claiming the ownership by right of discovery, they moved it from the property of the Oregon Iron & Steel Co. Two other men who owned land in the vicinity also set up property rights for the meteorite, which weighs 18 tons, is 25 ft. at the circumference of the base, and is four ft. high by seven ft. wide. An analysis shows that it contains 91.65 percent iron.

R. S. Warner, Linn Bentley, W. Babcock, L. F. Feiser and other citizens of Columbus, O., are considering the advisability of erecting a blast furnace at Sandusky, O. The Sandusky Chamber of Commerce has become interested and the city council of that city has decided to issue $75,000 in bonds to assist the new enterprise if it is carried out. The Columbus people are looking for a site of 75 acres, as they desire room for expansion.

Philadelphia Foundrymen's Association.

Making of By-Product Coke.

The Philadelphia Foundrymen's Association held its 144th meeting at the Manufacturers' Club, Philadelphia, on Wednesday evening, Feb. 1. Thomas Devlin, president, occupied the chair, and the meeting was called to order at 8:15, with 65 members and visitors in attendance. The treasurer's report showed a cash balance of $2,129.09, all bills being paid to date.

Secretary Evans stated that several of the members accepted the invitation and attended the annual meeting and dinner of the New England Foundrymen's Association at the Exchange Club, Boston, Mass., on Jan. 11. He then called upon Mr. Brown, who was one of the party, to make a report. Mr. Brown said that the members from Philadelphia were royally received and entertained, the meeting being quite largely attended. In presenting a neatly framed etching of the Old North Church, the hearty wishes of the New England Foundrymen's Association were extended to President Devlin and the members of the Philadelphia association, and special attention was called to the Historic Association of Boston, and in particular the history of the Old North Church. In closing his remarks Mr. Brown made a motion to the effect that the secretary be instructed to formally acknowledge the receipt of the etching referred to, and that he endeavor to have the same placed upon the wall of the meeting room at the Manufacturers' Club, provided satisfactory arrangements could be made with the board of governors.

The members were invited to attend a meeting of the Franklin Institute on Feb. 2 and hear a lecture to be delivered by Mr. Richard Moldenke on "Testing of Cast Iron."

Edwin A. Moore, president of the American Coke & Gas Construction Co., Camden, N. J., was then called to read his paper on the subject of "By-Product Coke as Made by the Coke Oven Plant of the Otto-Hoffman and United-Otto Types, Camden, N. J."

Introductory Remarks.

By way of introduction Mr. Moore said:

Mr. President, Secretary and Gentlemen: I want to say in prefacing the paper that the president very wisely referred to it as the paper which will be read. When the arrangement was made with me in regard to talking to you about by-product coke plants, etc., I was ill and since recovering have been obliged to get over the country through snow storms and otherwise, and I feel greatly indebted to Mr. D. T. McLeod for preparing most of the detail information (or, in fact, all of it), in connection with this paper.

The opening portion, however, does not make any reference to the introduction into this country of what is properly known as by-product coke ovens, and I know that it would be a matter of interest to all of us Philadelphians who are assembled here—I say us because it was my privilege to be identified with the machine shop and foundry business many years ago, consequently I feel more at home with you than I would otherwise.

So far as my personal knowledge is concerned, the by-product coke oven was introduced into this country about ten years ago through the efforts of Dr. F. Schniewind, of the United Coke & Gas Co., of New York City. He was at that time instrumental in the formation of the Otto Coke & Chemical Co., of Pittsburg, Pa., and is now vice president of the United Coke & Gas Co., of New York City. He induced Mr. William L. Elkins Jr., to become interested in the by-product coke oven and to take up the matter. At about the same time the Solvay Process Co., of Syracuse, N. Y., became interested in the same question and installed a small plant of Semet-Solvay ovens in Syracuse in connection with its soda ash works. By the combined efforts of Dr. Schniewind and Mr. Elkins arrangements were made to build a plant of Otto-Hoffman ovens at the works of the Cambria Steel Co., who had become interested in this question and had sent experts abroad to investigate the matter with a view to making coke at its steel works from coal obtained from its mines nearby. Now the United Coke & Gas Co. and the American Coke & Gas Construction Co., with which I have the honor to be connected, are affiliated with a corporation known as the American Coal Products Co., of which Mr. George W. Elkins (son of the late Mr. William L. Elkins) is president. You will see as the paper is read how the by-products are utilized by the American Coal Products Co., particularly as regards tar and ammonia, which result from the carbonization of coal in the by-product ovens. The reason for the introduction of the by-product oven as seen by Mr. William L. Elkins Jr., was largely because of the waste that takes place in carbonizing coal in what are popularly known as the beehive oven, in which the celebrated Connellsville coke is made. As a matter of reality, I guess we get very little of what was originally known as Connellsville coke.

The contrast I wish to bring to your attention is between Connellsville, or beehive, and by-product coke; that which is made in beehive ovens, where all waste products from the coal go into the atmosphere, of which about 30,000,000 tons of coal are carbonized every year. About 20,000,000 tons are carbonized into coke for blast furnace use and the balance for sundry other manufacturing purposes. In this connection we would like to impress upon your mind the fact that there goes off as waste products from this 30,000,000 tons from 80c to $1 per ton. Consequently you can see the advantage of saving these waste products because it is not American-like to see so much waste go into the air. Our friends, the financiers, are usually after the mighty dollar, and they don't like to have it get into the air where they can't get it.

By-product ovens have been in use throughout Germany and other parts of the continent, and largely through England during the past 25 years. There is not anything in the way of a beehive oven in operation in Germany at the present time. Those of you who have been abroad know (I have seen pictures of it), that the by-product coke oven produces all the coke that is used abroad, through Germany particularly, but not so much as yet in England. The introduction into this country was comparatively slow at the first, but the field has greatly increased during the past three or four years. There have been built, or are in course of construction at the present time in the United States and Canada about 3,950 by-product ovens, about 2,605 of these being of the Otto-Hoffman and United-Otto systems, carbonizing approximately 15,000 tons of coal per day and about 1,345 Semet-Solvay, carbonizing approximately 8,000 tons of coal per day, amounting in a year to a total carbonization of approximately 8,400,000 tons. It will thus be seen that, although the number of by-product coke ovens apparently does approach the number of beehive ovens installed, on account of the difference in the size of the charge and the shorter coking time, the coke made in by-product coke ovens will be much nearer the total coke tonnage of beehive ovens than would at first be supposed.

Mr. Moore's Paper.

The paper, which was profusely illustrated, was then read by Mr. Moore as follows:

It is not the writer's purpose to discuss the relative merits of the different types of oven, but to describe the method of manufacturing coke and the recovery of the by-products from the coal by means of the Otto-Hoffman system. Let us first discuss the objects of a few of the typical plants which have been built, and the writer will then describe a specific plant.

The first plant built in this country was two batteries of 30 ovens each for the Cambria Steel Co., at Johnstown, Pa., which was mentioned before. In these ovens was coked a low volatile coal from the company's own mines, to produce a coke satisfactory for blast furnace use, and incidentally the recovery of tar and ammonia. On account of the low percentage of

volatile matter in this coal, the gas produced was only a little more than sufficient for heating the oven batteries. This plant has been in operation now for approximately ten years and two additions of 100 ovens each have been made at different times. Another plant is that of the New England Gas & Coke Co., at Everett, Mass., consisting of 400 ovens, built for the purpose of manufacturing from Cape Breton coal a coke satisfactory for foundry, locomotive and domestic purposes, but the principal object of the plant was to supply illuminating gas to the City of Boston and the surrounding suburbs; also the recovery of the ammonia in the form of sulphate of ammonia and the tar which is distilled by a coal tar company in the near vicinity of the plant. Another plant is that of the Dominion Iron & Steel Co., Ltd., at Sydney, Cape Breton. This was built for the purpose of manufacturing from Cape Breton coal a coke satisfactory for blast furnace use, the surplus gas to be used in open-hearth furnaces, and the recovery of tar and ammonia. The plant of the Maryland Steel Co., at Sparrows Point, Md., consisting of 200 ovens of the long type, has for its object the manufacture of blast furnace coke, illuminating gas for use in the city of Baltimore, and the recovery of tar and ammonia in the form of either concentrated liquor or sulphate of ammonia.

The above mentioned plants give an idea of the many methods of utilizing the by-products, especially the surplus gas and the uses of the coke manufactured by this system. The ammonia produced is usually worked up at the plant into either concentrated ammonia liquor or sulphate of ammonia. The tar is usually disposed of to coal tar companies who distill same, utilizing the pitch for the manufacture of roofing pitch or roofing felt, the heavy or anthracene oils for creosoting, and by the further distillation of the tar separating the various lighter oils for the manufacture of tar oil products. By this method of manufacturing coke the by-products may be recovered and utilized in various ways, as above described, and thus become a source of revenue which will largely reduce the cost of the coke instead of letting all of these products go to waste as in the present manner of manufacturing coke in the beehive ovens.

Many other plants have been built of the Otto-Hoffman system, having many various uses for their products. The writer can best describe the manufacture of coke and the recovery of the by-products by this system by describing the plant of the Camden Coke Co., which is located in Camden, N. J., on the east bank of the Delaware river, near the Kaighn Point ferry. This is a plant which is near at hand and may be visited by the members of this association if they are especially interested.

[At this point the speaker, with a stereopticon, displayed views of a number of coke plants, including those of the Cambria Steel Co. and Camden Coke Co.]

These views will give you an idea of the general appearance and equipment of coke plants both in this country and abroad. The last is a view of the plant which I will now describe.

This plant has for its object the manufacture of coke foi metallurgical, foundry and domestic purposes, the use of the surplus gas for illuminating purposes, and the recovery of the ammonia in the form of concentrated ammonia liquor, the tar being disposed of to other parties who distill same for the recovery of its different products. The coke made at this plant during the two years of its operation has been disposed of to blast furnaces, foundries, and also very largely for domestic purposes. For the latter purpose, when the coke is discharged from the ovens, it is crushed to various sizes, and at the present time the greater portion of the coke produced is sold to supply the demand for this purpose. The illuminating gas which is made is distributed at about 10 lb. pressure to Trenton, 38 miles away, supplying the intermediate towns between Camden and Trenton, and is used at Camden under ordinary pressure. Entirely satisfactory results have been obtained by this plant, both in the coke produced and the large quantity of illuminating gas made, which very much exceeds the production of most plants of this size on account of the installation of Benzole enrichment, this being a special feature of this plant which will be described later.

The Quality of Coal.

One of the most important things to be determined in connection with a new plant is the coal to be used. This should be a good grade of bituminous coal of from 25 to 32 percent volatile matter and about 68 to 75 percent of carbon. In selecting the coal, the purpose of the coke should be considered in order to get a coal which will make a coke best adapted for the purpose intended, whether for metallurgical, foundry or domestic purposes. The coal should be low in sulphur—not over 1¼ percent for metallurgical purposes—but the lower the better for all purposes, so that washing will not be necessary at the coke plant. If obtained in the form of "run of mine," it must be crushed at the plant to sizes which will pass through a 1½-in. mesh; the finer the better, especially if the coke is for metallurgical purposes, because the fine coal will make a stronger and more uniform structure in the coke, which is better adapted to carry the burden in blast furnaces, and if there is any slate in the coal it is will broken up and more uniformly distributed throughout the mass. The by-product oven permits various grades of coal to be used and also various mixtures to be used. At this plant two or three grades of coal are used to get certain grades of coke and also to obtain a large quantity of illuminating gas. A coal of this class should yield per ton about 70 to 75 percent of coke, 9,000 to 10,000 cu. ft. of gas, 10 gallons of tar, and 5 pounds of ammonia.

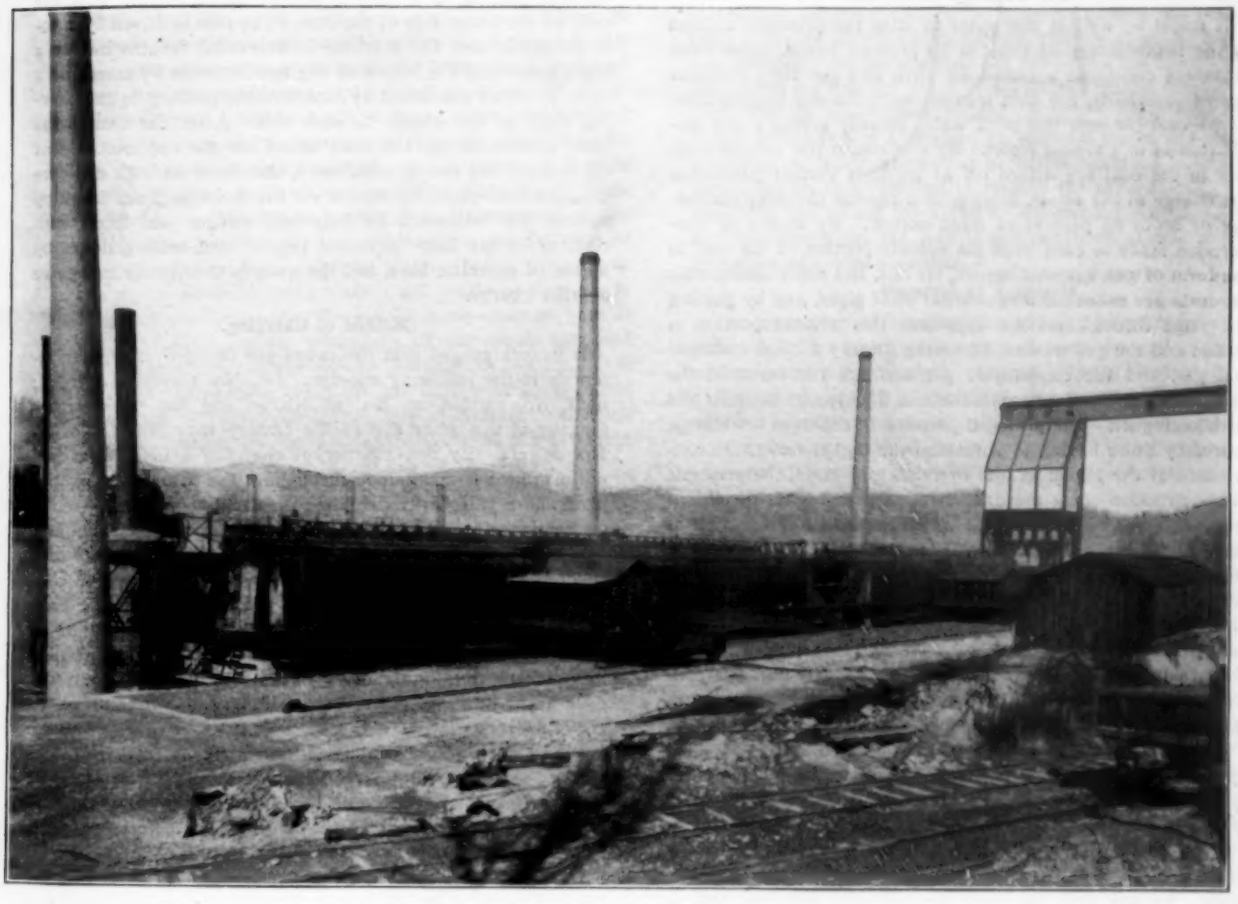
The coal for this plant is brought by barge to the docks on which travels an unloading crane which picks up the coal from the barges by means of a clam shell bucket and discharges it, either into the coal storage bin or to the storage pile. The crane has an inclined frame supported on upright frames at either end and travels on a double track on the wharf end and on a single track on a girder at the coal bin end. The crane travels the length of the coal bin and wharf, and both traveling gear and the carriage for the bucket are operated by means of steam engines and boiler mounted on the frame or carriage at the wharf end. At the coal bin end is suspended a steel hopper feeding into a pair of roll crushers operated by electric motors. The bucket is suspended from a carriage which travels up an inclined track attached to the main trusses, and discharges the coal either in the steel hopper to be crushed or into the storage pile, or it takes up the coal from the storage pile and discharges it in the crusher and thence into the bin. It will thus be seen that the crane traveling the entire length of the bin and dock can pick up coal from any part of a barge or storage pile and discharge into any part of the coal bin. This crane has a capacity of 100 tons per hour and the storage pile has a capacity of approximately 8,600 tons. The coal bin is of the Berquist suspension type, carried on two outside rows of columns at a sufficient height above the oven batteries to allow a clear space between same for the charging larry to travel under the bin to be filled from same by spouts connected to the bottom, these being placed at intervals of 12 ft. throughout the length. The bin is constructed of steel and is lined throughout with concrete and expanded metal. It has a capacity of 1,800 tons of coal, which is sufficient for about 3½ days supply for the 100 ovens, which carbonize approximately 500 net tons of coal per day, giving as a result approximately 375 tons of coke, 1,850,000 cu. ft. of 18-candlepower gas, 2,500 pounds of ammonia, and 5,000 gallons of tar. Over the oven batteries are steel trusses extending the entire length; on the lower portion of these a track is placed on which travels the larry for charging the ovens. These trusses have a clear span from the coal bin to supports between the two batteries, and from this point to the further end of the next battery. They are made of steel

and are of the usual form of bridge truss. The larry consists of a steel frame mounted on wheels, and from this frame are suspended six steel hoppers with spouts and grates at the bottom of same. The larry is operated by a 15-h. p. motor and travels the entire length of the two batteries and discharges about 6¼ tons of coal into each oven in its regular turn by means of holes in the top of the ovens corresponding to the spouts.

The Oven Batteries.

Let us now decribe the oven batteries. These consist of a mass of brickwork supported on a concrete and brick substructure. This sub-structure consists of concrete walls on which are built brick arches forming a floor or support for the ovens proper. There are 50 ovens in each battery, these being 17 in. wide, 6 ft. 6 in. high and 33 ft. long and are placed 2 ft. 10½ in. on centers. Between each oven is a set of vertical heating flues, directly below same combustion chambers and above same a horizontal flue. Below each oven is an air chamber and below each battery under two of the supporting arches are regenerators running the entire length and connecting at one end into a common flue to the stack. The openings or ports serve as a passage for the supply of the preheated air from the regenerators to the heating flues, and for the exit of the off-gases from the heating flues to the regenerators. One of these openings is placed directly below each oven. The burners are placed on either side of the battery at the end of the combustion chambers. The gas and air supply for heating the flues is alternated on either side of the battery every half hour, the well-known Siemens regenerative principle being used for the reversal of the gas and air supply.

Let us now follow the manner of heating the ovens, supposing that the gas is burning on the right hand side at the present time. The air supply for the burner is discharged by a fan at the end of the battery into the lower flue of the regenerator on the right hand side, passes up through the openings in the lower arches, through the heated checker brick, through the openings into the air chamber. A damper is placed over each opening which allows the regulation of the air supply to each set of flues. The air passes through the ports in the wall between the air and combustion chambers into the combustion chamber, where it mixes with the burning gas and passes up into the vertical flues (which are divided into two sets midway the length of the oven by a wall extending from the bottom of the chambers to the top of the flues). The burning gases pass from the vertical flues through the upper horizontal flues over the partition wall into and down through the vertical flues on the left hand side into the combustion chamber, through the openings in the wall into the air chamber and down through the opening into the regenerator, giving up a large amount of the heat in passing through the checker work to the lower flue, and thence into the stack. The arrangement of gas burning and the air supply is reversed each half hour by means of valves at the end of each wharf. In this manner the air is always preheated from about 800 degrees Fahr., the temperature of the supply from the fan to about 1,500 to 1,800 degrees Fahr. when entering the combustion chambers, and the temperature of the off-gases to the stack is reduced to about 600 degrees Fahr. The gas is supplied to the burners from the mains which connect with the regulating gas holder. The heat value of the fuel gas is approximately 550 B. t. u. per cubic foot, and about 6,000 cu. ft.



COKE PLANT OF THE CAMBRIA STEEL CO. AT JOHNSTOWN, PA.

of gas are required per ton of coal carbonized, giving a temperature in the ovens of about 2,500 degrees to 2,800 degrees Fahr. The air supplied by the fan is preheated before entering the regenerators in the following manner:

The air is drawn by the fan through the middle arches of the substructure the entire length of the battery, through openings in the top of each arch into an end chamber from which it passes through the small flues under the chambers the entire length of the battery into a corresponding chamber at the other end, and from this is drawn by means of a pipe into the fan and passed into the regenerator on either side. In this manner the air is heated from the temperature of the atmosphere to about 800 degrees Fahr. before entering the regenerators. By means of preheating the air and the system of regeneration, the maximum efficiency is obtained from the gas burned and higher heats maintained in the ovens than would otherwise be possible.

The Principle Involved.

It might be well at this point to state the principle utilized in the manufacture of coke in by-product ovens. The oven chambers constitute a closed air tight and gas tight chamber heated externally, the heat transmitted from the heating flues to the coal through the brick walls, thereby giving a dry distillation as in a closed retort. By this means the volatile matters in the coal are driven off as the heat further penetrates the charge in the retort, leaving as a residue the coke consisting of 80 to 85 percent of fixed carbon. By means of connections made to each oven the volatile portion of the coal in the form of gas, aqueous vapors, tar oils, and other condensible products are taken off into circular steel pipes, and by passing the same through various apparatus this volatile portion is cooled and the gas washed, obtaining thereby a clean commercial gas, and the condensible portions are recovered in the form of tarry oils, aqueous ammonia liquor, and benzole and its homologues. The principal portions of the oven brickwork, especially those having to withstand the higher heats, are constructed of the higher grades of refractory clays, the principle of construction being the outgrowth of many years of experience in this line, as a result of which the structures as built at the present time are able to withstand the effects of expansion and contraction due to heating and cooling, and due to varying temperatures in the regenerators and the cooling effect of placing a charge of moist coal suddenly in contact with the highly heated oven walls. We have not as yet been able to obtain as good a grade of brick in this country for this construction as are obtained in Germany. This is largely due to the fact that we have not as good clays for their manufacture.

The oven chambers proper, as above stated, are 33 ft. long, 17 in. wide and 6 ft. 6 in. high. They are closed at either end by cast iron, brick-lined doors, which in some cases are luted with clay and in other cases are especially constructed to give a metal joint or seal, thereby doing away with the necessity of clay luting and thus reducing the cost of labor for this work. In any case the ends are air-tight and the coal is charged into these ovens at six points in the length of same and the coal leveled off to a uniform height by means of bars or rods passed through small openings in the doors at the ends. By later improvements in the method the leveling is done by means of an electrically driven ram or bar which travels in and out, thereby cutting down the labor expenses in this connection and giving much more uniform charge.

The entire battery is heated uniformly throughout, means being provided for regulating the amount of gas to each set of flues. The gas driven off from the coal during the first portion of the heating is rich in illuminants and has an average heat value of about 650 B. t. u. This gas, for the first ten to fourteen hours, is taken off into the collecting main through the standpipe, neck and drop valve indicated. At the end of this period the drop valve on this side is closed and the gas for the remainder of the coking period is taken off through the standpipe, neck and drop valve into the main on the opposite side. The gas for this last period is lower in illuminants and has an average heating value of about 525 B. t. u. Its illuminating value will vary with different coals from about 3 to 8 candle power. The illuminating value of the rich gas given off during the first period will vary from 13 to 19 candle power. One set of standpipes and valves are provided for connecting each oven to the gas mains on either side. After the coal has been in one of the ovens for a period varying from 24 to 30 hours, all the volatile matter has been driven off and the charge is ready to be pushed from the oven. At this time the doors are raised on both ends by means of electric hoists which travel on a track directly over the doors on either side, and the charge of coke is pushed from the ovens by means of a ram or bar with a large head. This ram is mounted on a steel frame of the pusher machine and is propelled by means of an electric motor connected through intermediate gearing to a driving pinion which meshes with the rack on the under side of the ram. The ram is driven by a 50-h. p. motor and the machine is traversed lengthwise on a track extending the length of the two batteries by means of a 25 h. p. motor connected by intermediate gearing to the driving shaft of the wheels on each side. After the charge has been pushed out on the coke wharf on the opposite side of the battery, the ram is withdrawn, the doors on both ends are dropped into place by means of the hoist and set hard up against the brickwork by bars and wedges and luted with clay, or in the later improved type of self-sealing doors by means of eccentric bars, and the oven is then ready to receive another charge.

Method of Charging.

It is so arranged that the ovens are charged at regular intervals in the following manner: 1st., No. 1 oven is charged; next, No. 10, No. 20, No. 30, No. 40 and No. 50; then beginning at the other end of the battery with No. 5, No. 15, No. 25, etc. By this manner of charging a more even and uniform heat is maintained throughout the batteries, thus giving a more uniform coking time for each oven. Each oven is pushed in its regular sequence in the manner above mentioned. The coke wharf upon which the coke is pushed consists of a concrete and expanded metal wharf or floor supported on concrete columns and is covered with red brick. After the coke is pushed from the ovens on to this wharf, it is quenched by means of water from a hose, using as little water as possible in order to thoroughly drive out the heat and prevent the coke from burning after discharged into the cars or on to the conveyors.

When quenched it is loaded into steel barrows and discharged into cars from the edge of the wharf, or through holes in the wharf on to the belt conveyor which travels the entire length of both wharves and discharges into the crusher at the ends of the batteries. If the coke is for foundry or metallurgical purposes it is loaded directly into the cars as "run of oven" coke, or it may be divided; the ends and top portion of the charge being discharged on to the conveyor and delivered to the crusher, and the middle portion of the charge being loaded into the cars for foundry use.

The coke to be crushed is conveyed to the end of the battery, and by means of a cross conveyor, it is conveyed to a roll crusher located at one end of the coal bin. It is run from this crusher up an inclined belt conveyor to the storage bin. At the top of this bin is placed a motor-driven rotary screen 8 ft. diam. x 40 ft. long. The crushed coke is passed by means of a chute into this screen and discharged from the same into five different compartments in the bin, these compartments each having a capacity of 250 tons of coke. By this means the coke is sized and the various sizes, viz: 2½ in., 2 in., 1½ in., ⅞ in., and breeze, can be loaded from either side of the bin into wagons, cars or barges. It will be noticed that this bin is located on a dock, which allows a barge to

come up on either side of the same. In discharging from the bin the coke passes over screens in the chutes, which takes out the dust or breeze; this breeze being used in the boiler house for generating power. Certain sizes, principally nut, are put up in 20-lb. bags which retail at 10 cents. A very extensive trade has been established for this bagged coke, and there is also a large demand for the other sizes for domestic use, the stove and egg size being utilized in furnaces and heaters, and the breeze being used for generating steam in boilers and also for filtration purposes. At the present time nearly the entire output of 375 tons of coke is being disposed of for various domestic purposes; most of this coke is distributed by teams. No doubt most of you are familiar with the ever present advertisements setting forth the manifold advantages of Otto coke and have come to realize that this must indeed be the long-looked-for panacea of all household ills.

We will now return to the volatile portion of the coal, which has been driven off from the ovens and passed through the standpipes and valves into the collecting mains. A certain portion of the heavier condensable products are collected in these collecting mains, the mains being provided with clean-outs where these products, such as heavy pitch form, so that they may be removed; a portion of these products are also taken off by the constant stream of tar which is flushed through the mains in order to keep them clear at all times. These mains run the entire length of the battery and at the ends two pipes, one for the rich gas and one for the poor or lean gas, are run to the condensing plant. During the passage of the gas to the condensing plant a still larger portion of the condensable products are recovered, in some cases as high as 50 percent; these consist principally of the heavy tars and oils and some water vapor due to moisture in the coal. On reaching the condensing plant the gas from each main passes through two entirely separate systems of apparatus in being cooled and treated for the further recovery of the products.

Treatment of Gas.

The apparatus on each side is of the same design, and the gas is treated in both sets at this plant in the following manner:

It first passes through the air and water coolers, consisting of a system of rectangular pipes one above the other, connected at the ends by return bends. The gas passes in at the bottom, passes back and forth through each section in a contra direction until it reaches the top and then passes down through a vertical pipe into the common main. These pipes act as air coolers ordinarily, but in warm weather water is sprayed over them from the top and is collected in a cistern below to be cooled and used over again if desired. The gas then passes through circular water coolers, which are 8 ft. in diameter, with 4-in. tubes expanded into heads at either end. The gas passes around the tubes in a downward direction and the water through the tubes in an upward direction, so that the coldest gas is brought in contact with the coldest water, thus obtaining the most efficient cooling results. The cooling in this apparatus should be done gradually and with special care so as to prevent the formation of naphthalene due to a sudden cooling of the gas at any point. The temperature of the gas is reduced in these coolers to about 80 degrees Fahr. and a large portion of the remaining heavier tar oils and the water vapor are recovered; these are led off from the apparatus by drain pipes into a compartment tank where the ammonia liquor, which is mixed with the same, and is separated by gravity to be treated separately. The gas next passes through a tar scrubber which consists of a square tank with a diaphragm plate forming an upper compartment, and the gas entering this compartment passes down through tubes which are set in the diaphragm plate, these tubes sealing at the bottom in a mixture of ammonia liquor and tar. The gas passing down through the tubes has to break through a liquor seal, thereby passing around the bottom serrated edges of the dip pipes, which gives a cleaning or scrubbing effect for removing the tar. After passing into the chamber around the tubes it is taken off through a connection to the main which connects with the exhausters. Ammonia liquor is fed into the tar scrubbers and the mixture of ammonia liquor and tar obtained in the same is led off to a compartment tank where the liquor and tar are separated by gravity so that they may be treated separately. The gas up to this point has been drawn through the apparatus by a slight pressure in the ovens and by a vacuum created by the exhausters. It now passes through the exhausters which are of the usual type direct connected to horizontal steam engines, and is forced by them under a pressure equal to about 16 or 18 inches of water, through the P. & A. tar extractors which remove the finely divided particles of tar and the lighter oils by passing the gas through circular drums constructed of perforated plates placed closely together; the perforations of the various plates are staggered so that the small streams of gas passing through the perforations impinges on the plates beyond, thereby dropping out the tars and oils. In this machine the gas enters the lower chamber, passes up into the drum of perforated plates, through the same into the upper chamber and out into a connecting main. These drums seal in a mixture of ammonia liquor and tar and a greater or lesser amount of perforated surface is exposed, depending on that required to remove the tar and oils. This apparatus can be set for a certain differential pressure necessary to remove the tar, and is self-regulated at this pressure by means of counter-weights.

Removal of Ammonia.

The next step of treating the gas is the removal of the ammonia. The ammonia is removed from the gas to the best advantage at a temperature ranging between 60 degrees and 75 degrees Fahr. It is, therefore, the object to have the gas at about this temperature when entering the ammonia washers. This enables the ammonia to be removed with the least amount of water or weak liquor which is used for the washing purposes, thereby making a stronger liquor to be treated later on in the ammonia house for the conversion of this liquor into a finished product. The ammonia washers consist of circular shells, 8 in. in diameter, with a bottom and top compartment, and intervening spaces between the same filled with perforated plates or with wooden slats set at right-angles to each other, attaining by both of these means the breaking up of the gas into small streams and forming a large area of wetted surface for contact with the gas, whereby the ammonia can be most readily removed. Two of these apparatuses are used on each side, the gas passing through them in series. In the washer furthest from the exhausters a large portion of the ammonia being already extracted from the gas in the first washer, it is washed by clean cold water, this water being fed into the washers by means of a number of sprays set in the top of same. The gas passes up through the washer and the water down through the same removing the last traces of ammonia from the gas and resulting in a weak ammonia liquor which is drained to a compartment tank and pumped from there to the overhead feed tank, from where it is fed into the first washer. Here it washes the gas which contains a greater amount of ammonia, and by washing with this weak liquor a large percentage of the ammonia is removed and the liquor greatly increased in strength. This liquor constitutes what is called the strong liquor which is about 1 percent to 2 percent in strength, and the manner in which this liquor is treated will be described later on in connection with the ammonia house.

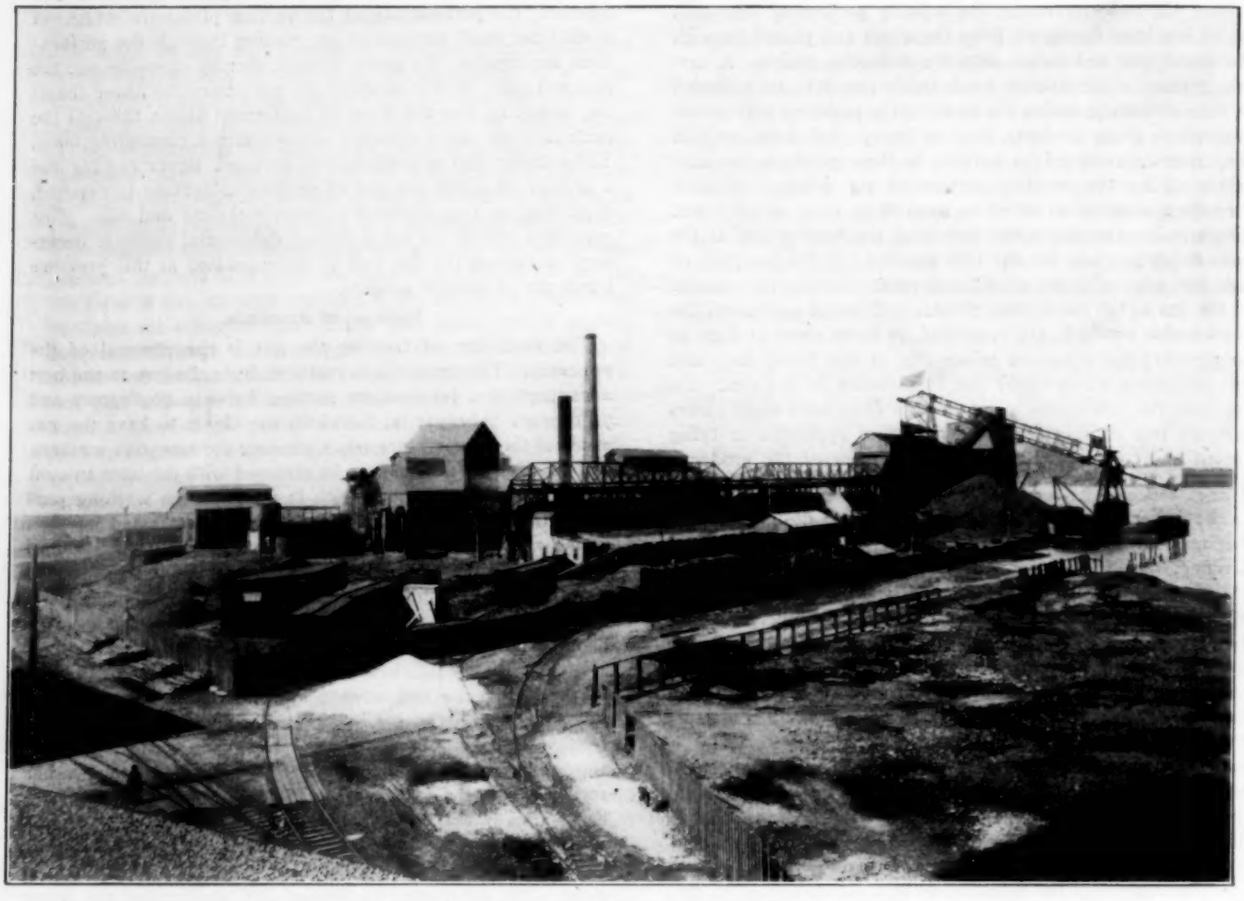
As the poor gas is used only for heating purposes, the illuminants in same, (which are principally benzole and its homologues,) are practically of no value, and in order to utilize these illuminants to the greatest advantage the poor gas is now passed through three washers of a type similar to the ammonia washer, and in passing through these in series the

gas is washed by tar oil which has a strong affinity for benzole and removes from this gas the greater percentage of same. This tar oil, after passing in series through the three different washers, thereby increasing the amount of benzole in the same, is then pumped to the Benzole house where it is treated in a manner to be described later on. The poor gas after leaving the benzole washers passes to the regulating gas holder maintaining about 7 in. water pressure, and from there to the batteries where it is used for heating purposes.

The rich gas after being washed in the ammonia washers passes out of the condensing house and to the storage holder. In order, however, to increase the illuminating value of this gas by utilizing the benzole removed from the poor gas, a small portion of the rich gas is taken at a point beyond the ammonia washers by means of a pipe, through a gas compressor, passed to the Benzole house and through one of the benzole stills, in which the tar oil previously mentioned is being treated. The tar oil from the benzole washers, in passing down through these stills which are heated with steam gives up the benzole (which is evaporated by means of heat,) and the rich gas in passing upward through this still takes up these benzole vapors. The current of rich gas is then passed back into the rich system in front of the exhausters in the condensing house, is mixed with the larger volume of gas in these mains and thereby increases the candle power of the whole quantity. In this manner a much greater illuminating value is obtained from the coal, and the high candle power rich gas when later on mixed with water gas from an auxiliary plant requires less enrichment in order to get a mixed water and coal gas of a high candle power. Water gas is only made at times when more gas is required than can be supplied from the coke plant. This gas is made in a Standard Lowe Apparatus. This is one of the first instances where this method of benzole enrichment has been used in this country, it being done here, we believe, on a larger scale than has ever before been attempted, and it has demonstrated its value in this plant to the thorough satisfaction of all parties concerned.

Condensable Products Removed.

The condensable products in the gas are finally removed from the various apparatus and piping in the condensing house by drains to separate compartment tanks. The strongest ammonia liquor, which will vary from 1 percent to 2 percent, is pumped to a feed tank in the ammonia house, and the lighter tars obtained in this apparatus are pumped to the tar storage tanks. The heavier tars which are condensed in the gas mains between the ovens and the condencing house are drained into large tanks or pits and a portion of this tar is pumped over and over through the collecting mains on the battery. The balance of the tar is pumped to the tar storage tanks and is loaded from this tank into barges for treatment at the works of the coal tar products people. The picture before you is that of a large condensing plant with apparatus similar to that described. It forms a part of the Coke Plant of the Lackawanna Steel Co., Buffalo, N. Y., and is designed to treat 33,000,000 cu. ft. of gas per 24 hours. It is undoubtedly one of the largest single plants of its kind in the world. The ammonia liquor is fed from the overhead feed tank in the ammonia house into circular stills. These stills consist of three parts, a volatile still and a lime mixing chamber, which parts comprise one unit, and the fixed ammonia still, which comprises a separate unit. The liquor passing in at the top of the volatile still is preheated and as it passes down through the upper portion of the volatile still the volatile ammonia is freed by contact with steam and hot ammonia vapors from



THE CAMDEN COKE CO.'S PLANT AT CAMDEN, N. J.

below and the liquor flowing into the chamber below is mixed with milk of lime and agitated by compressed air to give a thorough mixture. The liquor and lime passing from this chamber into the lime still, comes into further contact with steam, thereby setting free the fixed ammonia. The waste liquor passes out of the bottom of the lime still into the drain. These stills handle approximately 30,000 gallons of 1¼ percent liquor per day, reducing the strength of the ammonia in the waste to a minimum. The vapor which is given off from the still passes into a circular apparatus 4 ft. in diameter, consisting of alternating absorbing and water-cooled sections. In this apparatus the gas passes down through the ammonia liquor in the various sections, this liquor constantly overflowing and increasing in strength as it reaches the bottom. It is also brought in contact with water-cooled surfaces, thereby reducing the temperature and increasing the strength to a greater degree. In this apparatus the strength of the liquor is increased to about 16 percent to 20 percent, which is a commercial product used for various purposes.

In some plants the ammonia gas from the stills is brought in contact with sulphuric acid in large lead-lined boxes, thereby forming a precipitate or salt, which is called sulphate of ammonia. This salt is then drained from the boxes and passed through a centrifugal drying machine whereby the moisture is removed and the salt sold for use as a fertilizer. The farmers are being educated to its use at the present time through the Dept. of Agriculture and, as the country grows and people become more educated in scientific farming, sulphate of ammonia will be used more and more as a fertilizer.

How Power is Supplied.

The power required for the different apparatus and machinery throughout the plant is supplied by electric power generated in the power house, using for the purpose coke breeze in the boilers and a portion of the poor gas in gas engines. The power plant consists of three sets of water tube boilers, 256-h. p. each, these boilers being equipped with a forced draft system and special grates for burning coke breeze. The boiler fronts are also provided with connections so that gas may be used for fuel if desired. Especially efficient results have been obtained by the use of the forced draft system in burning coke breeze, the boilers showing by a test conducted under ordinary working conditions that they were developing 389-h. p. each, or more than 50 percent above the rated capacity without showing especially deteriorating results. These boilers are connected by a breeching to a stack which is common both to the boiler house and the ovens. This stack is of special perforated brick, and is 7 ft .in diameter by 150 ft. high. The boiler is provided with the necessary feed pumps, injectors and other customary fittings. The bulk of the steam generated here is used for a Green engine of about 150-h. p., for the exhauster engines in the condensing house and for the stills in the ammonia house. In the engine room are placed the Green engine which is used under ordinary conditions for developing electric power required, this engine being belted to a 180 kw, 220 volt, alternating current generator, which is placed on a line shaft. This generator furnishes ordinarily sufficient power for the entire plant and is seldom used up to its capacity except momentarily. There is also a 280 kw, 220 volt, alternating current generator direct connected to a Westinghouse gas engine. This gas engine is used ordinarily as a reserve, but at intervals, when sufficient fuel gas is available, it has been operated by this gas with entirely satisfactory results. Notwithstanding the fact that this gas is unpurified, it is only necessary at intervals to place clean igniters, which is the only difficulty experienced with the use of same. It was the original intention to use this engine for the regular supply of power, but owing to the fact that the amount of fuel gas has been reduced in order to increase the quantity of illuminating gas, it has been unable to carry out the original intentions, except at intervals. On account of the benzole obtained from the poor gas, it has been found desirable to run the ovens longer on the rich gas side, thus getting a greater quantity of illuminating gas, but at a lower average candle power. This candle power, however, has been increased to that desired by the use of the benzole enrichment. This plant is, we believe, one of the few in this vicinity which is using alternating current for power purposes, especially on apparatus where any variation in speed of the motors is desired; it has, however, proven very satisfactory. The power plant is provided with the necessary generator and feed panels complete with the customary fittings for this purpose. The lighting for the plant is supplied by an outside circuit, incandescent lights being used throughout, these being enclosed incandescents in certain portions of the plant, particularly in the Benzole house.

In regard to the Benzole plant, we believe it unnecessary to further describe this, as it would take the writer into considerable amount of detail, which would not be particularly interesting to you, and the principal object of the Benzole plant was described earlier in connection with enriching the rich gas.

The Water Supply.

This plant has its own water supply consisting of a steel standpipe, 10 ft. in diameter by 100 ft. high, and two horizontal duplex steam pumps with a capacity of 1,200,000 gals. per day. The pumps draw the water by a suction line from the Delaware river, the foot-valves and strainer being placed in a cribbing in the dock on which the coke storage bin is situated. The water is distributed at approximately 40 lbs. pressure throughout a system which supplies the fire service lines, water for cooling apparatus, coke quenching, ammonia washing and various other purposes. This makes the plant entirely independent of the city service except for drinking water, and greatly reduces the cost of the supply. The office is placed near the entrance to the plant for the superintendent and necessary clerical force. All tests and analyses in connection with coal, coke, gas, tar, and ammonia products are made by a chemist, in a laboratory situated adjacent to the power plant. The duties of the chemist in these plants are important, as it is only by chemical analyses of the gas and liquors that wastes due to careless operation are detected. It is also his duty to analyze the coal, coke and tar and watch the operation of the condensing, ammonia and benzole plants. The heating and operation of the ovens also materially influence the quantity of the by-products produced.

The above description of this plant covers the principal and most salient features in connection with same, and the writer will be pleased to go into any further detail questions if information is desired by any of the members, or an opportunity will be given to any of the members of this association to visit this plant if they desire, especially to examine the coke, which is, I believe, the product most interesting to you.

Many improvements have been made in the design and construction of later plants, some of the principal features being as follows:

In connection with the oven construction, several plants have been built in which the length of the ovens has been increased from 33 ft. to 43 ft., thus increasing the capacity of the ovens to nine tons or approximately 30 percent at a very small cost, the principal increase in cost being ten additional feet of brickwork with the necessary increased foundations, and a slightly larger pusher machine on account of the longer bar required, and a larger coal larry, thus obtaining a much larger output at a slight increase in investment. While the average charge of the ovens at Camden is 6¼ tons, this charge has been increased in later ovens of the same length to 7 net tons. This has been done by increasing the height of the ovens six inches, and by the introduction of a leveling machine which enables coal to be leveled more uniformly than is done at this plant by hand.

The oven proper is at present built on steel beams supported on three concrete walls running the entire length of the battery. The regenerators are built underneath and are made entirely separate from the oven proper, a connection between

the regenerators and the ovens being made by a connecting brick flue at each three ovens. This construction prevents the possibility of cracks developing in the ends of the ovens due to the contraction and expansion of the regenerator brickwork. One of the principal objects of this construction is, however, to reduce the cost and to enable the introduction of auxiliary burners at different points in the combustion chambers, whereas in the type of oven at Camden only one burner is used at the end of the battery. The multiple burner system enables a little more uniform heat being maintained through the length of the oven so that the charge will be more evenly coked. The coke wharf at this plant has been replaced in later plants by a coke quenching machine. This machine consists of a water-cooled chamber approximately the size of the ovens, mounted on a steel frame. This chamber is made up with hollow side castings and circular top and bottom castings. The water is introduced into the bottom section, passes up through the sides and overflows at the top of the side sections, thereby coming in contact with the coke and quenching same with a minimum quantity of water. The steam evolved acts as a dryer and the surplus steam at the beginning of the operation passes out through stacks or pipes on top of the chamber. A heavy chain forms the bottom of the chamber, and this chain travels through same, passing under the bottom of the machine in its travel.

Method of Operation.

The method of operation is as follows: When the oven is ready to push, the machine is moved opposite the oven, the pusher ram pushes the charge of coke into the chamber, the doors on either end of the chamber are closed, and the water which is drawn from a trench running the entire length of the quencher track is discharged by a motor-driven centrifugal pump into the bottom portion of the machine, quenching in the manner above mentioned. After the coke is quenched the doors on either end are raised and the motor operating the chain is started. The chain carries the coke charge out of the chamber into cars at the end of same. By this method of discharge, the machine can travel along a series of cars throwing the ends of the charge in one car and the middle portion into another, or in case of an under-coked charge the entire charge may be distributed over a series of cars. In this manner a selection of coke may be made and the coke handled with a minimum amount of labor. On account of the steam acting as a dryer, if the quenching is properly done, the moisture will run from 3 to 7 percent when discharged into the cars. As the coke is not broken until discharged into the cars, the amount of breeze is also greatly reduced from 5 percent to practically nothing. This method of quenching gives the coke the grey metallic lustre which is to many foundrymen the indication of a first-class coke, but which is really no indication as far as actual results are concerned.

The above improvements are only a few of the many which have been made during the past few years with a view of simplifying the construction, reducing the cost of same, and particularly reducing the cost of labor by using machinery wherever advantageous. This all tends to reduce the cost per ton of coke made, which, of course, is one of the principal points to be attained. We feel very much encouraged by the many uses to which this coke is applied and especially at the accounts received from the foundrymen and furnace men using same, and at the increasing interest they are manifesting in it. We feel sure that if you will all give it a trial you will be amply justified by the results.

During the past few years the installation of these plants have received a great impetus over the preceding years since its introduction in this country. We, who firmly believe in the field open for these plants for the various objects, believe that in the next few years the number of beehive ovens built will be materially reduced and that the by-product oven will eventually replace the beehive oven. We feel justified in this belief because it will sooner or later be necessary, as competition becomes more severe, for manufacturers in this country to reduce to a minimum all waste products, as has already been largely done abroad, thereby reducing the cost of manufactures in every line.

The writer feels that he has not done full justice to this subject, owing to the fact that business demands have made it impossible, in the brief time allowed for preparation, to treat the subject in a more than a superficial manner, and he feels certain that further investigation on your part will convert you into advocates of this method of making coke rather than by the other method, whereby only about 63 percent of coke is obtained from the original coal, as in beehive ovens, instead of 70 percent to 75 percent coke and the by-products, as are obtained in the by-product ovens. I hope to have the opportunity at some future time to present to you more detailed and interesting data on this subject, and wish to thank you all for your kind attention to what must have seemed to many of you a lengthy and uninteresting discussion, as the subject must have been entirely new to some of you.

Discussing the Paper.

Upon motion a vote of thanks were tendered to Mr. Moore for the presentation of this very interesting subject, after which the following brief discussion took place:

Howard Evans: Every time the coke is dropped there is a loss of about five percent?

Mr. Moore: Yes, sir; so we were informed by representatives of the Cambria Steel Co.

Mr. Evans: In what way is that lost?

Mr. Moore: In breaking up into small particles as it falls into the cars, and it is likely to give trouble in handling in the cupola or the furnace. When the man puts the blast on, he has trouble in regulating the different beds; so that the more uniform the size of the coke, the better it is for use in the cupola or furnace.

Mr. Evans: How are you going to get the coke off the coke wharf and put it into bags?

Mr. Moore: We have a belt conveyor under the wharf where we drop the coke down to be taken to the coke crusher, and the selected portion is put into the cars for the foundry.

The meeting then adjourned. Among those present were:

Thos. Devlin, Thos. Devlin Mfg. Co., Philadelphia.
Geo. C. Davis, Chemist, Philadelphia.
H. O. Evans, Thos. Devlin Mfg. Co., Philadelphia.
Luther Shick, I. A. Sheppard & Co., Philadelphia.
T. B. Harkins, Harkins Fdy. Co., Bristol, Pa.
C. D. Matthews Camden Iron Wks., Camden, N. J.
Geo. M. Benkirt, Williamson Bros. Co., Philadelphia.
H. C. Matlack, Frank Samuel, Philadelphia.
C. D. Orr, Thomas, Roberts, Stevenson Co., Philadelphia.
Edwin A. Moore, American Coke & Gas Construction Co., Camden, N. J.
Wm. Hanson, Philadelphia.
A. M. Hopkins, Philadelphia.
Arthur Simonson, Wm. Wharton, Jr. & Co., Philadelphia.
W. I. Haldman, Pulaski Iron Co., Philadelphia.
Dr. E. E. Brown, C. R. Brown, T. H. Brown, E. E. Brown & Co., Philadelphia.
A. A. Miller, *Iron Age*, Philadelphia.
Geo. C. Davies, Pilling & Crane, Philadalphia.
A. G. Warren, J. W. Paxson Co., Philadelphia.
C. Gorman, Walter McDonald, Schaum & Uhlinger, Philadelphia.
W. O. Steele, Bateman Mfg. Co., Grenloch, N. J.
Walter B. Kennedy, Bethlehem Steel Co., Philadelphia.
J. C. Bennington, Penna. Iron Works Co., Philadelphia.
H. I. Tripple, Fairbanks Co., Philadelphia.
Adam Pugh, Isaac A. Sheppard & Co., Philadelphia.
F. K. Pennewill, H. J. Fuller, Abram Cox Stove Co., Philadelphia.
F. T. Wright, U. S. Cast Iron Pipe & Fdy. Co., Burlington, N. J.
John McGuigan, Sam'l McClay, North Bros. Co., Philadelphia.
Walter McWater, Bateman Mfg. Co., Grenloch, N. J.
Harry A. Phillips, Boulter Mfg. Co., Ind., Philadelphia.
Robt. G. Wells, The United Coke & Gas Co., New York, N. Y.
Guyon Miller, A. P. Tutton, Downingtown Mfg. Co., E. Downingtown, Pa.
Chas. H. Scheerbaum, Abram Cox Stove Co., Philadelphia.
S. H. Baird, E. B. Leaf & Co., Philadelphia.
H. W. Yost, T. J. Kelly, Thomas, Roberts, Stevenson Co., Philadelphia.
J. Pierpont, J. K. Dimmick & Co., Philadelphia.
D. T. McLeod, American Coke & Gas Construction Co., Camden, N. J.
Herbert Conrad, M. E., Buffalo Forge Co., Philadelphia.
Chas. Riceman, Pencoyd Iron Wks., Pencoyd, Pa.
Wm. Cook, Haines, Jones & Cadbury, Norristown, Pa.
R. Sylvester, J. Wesley Pullman, Philadelphia.
Jas. Riley, Philadelphia.
E. H. McCoy, S. G. Flagg & Co., Philadelphia.
Theo. D. Strickler, Davis Coal & Coke Co., Philadelphia.
Wm. Bond Read, Jr., Thos. Smith, Midvale Steel Co., Nicetown, Philadelphia.
W. L. Wright, Bethlehem Steel Co., New York, N. Y.
John Fleming, A. W. Biddle, S. J. Creswell Iron Wks., Philadelphia.
Geo. R. Sullivan, Rogers, Brown & Co., Philadelphia.
Howard Evans, J. W. Paxson Co., Philadelphia.
Frederick W. Myers, *The Iron Trade Review*.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until Feb. 28 for furnishing at the navy yards, Portsmouth, Boston, New York, Washington, Norfolk and Pensacola, as specified, a quantity of machine tools, etc., as follows: Schedule 63—engine lathe, centrifugal pumping sets, radial drill, planer, band saw, knife grinder; schedule 64—deck winches, milling machine, gear-cutting machine, drilling machine; schedule 65—saw table, boring machine, scroll saw, band-saw filer, band-saw setter and retoother and shear. Blank proposals will be furnished upon application to the navy pay offices, Portsmouth, Boston, New York, Norfolk and Pensacola, or to the bureau. Applications shoud designate the schedules desired by number; H. T. B. Harris, paymaster general, U. S. N.

The Yonge & Cline Co., Ocala, Fla., is in the market for a 14-inch or 16-inch lathe with 12-foot bed, also a sensitive drill press; will also need later either a shaper or milling machine.

The Clarksdale Machinery, Supply & Manufacturing Co., Clarksdale, Miss., is in the market for complete equipment for foundry and machine shop.

The Eureka Stove Works, 34th street and Fifth avenue, Birmingham, Ala., wants prices on foundry equipment, firebrick, sand, stove and range patterns, etc.

The O. K. Metal & Manufacturing Co., 319 W. Main street, Oklahoma City, O. T., wants to correspond with manufacturers of sheet metal.

The Yonge & Cline Co., Ocala, Fla., has been formed with R. E. Yonge, president, and Elmer E. Cline, secretary and manager, to conduct a manufacturers' general agency, and has taken over the Cline Engineering Co., of Auburndale, Fla. The company will also establish garage for taking care of automobiles and machine shop in connection for repairing all machinery of a light nature, such as gasoline engines, marine motors, automobiles, typewriters, cash registers, etc.

The Helm Machinery Co. has been organized at Kansas City, Mo., by J. H. Pfeiffer and W. G. Helm for the manufacture of cement building material machinery; office, 816 Wall street.

The Charleston Machinery & Manufacturing Co. has been incorporated at Charleston, S. C., by Armin Hartrath, A. S. Dickison, Charles Shimer, J. Ross Hanahan, Julian Mitchell Jr., and George H. Moffett; capital $50,000.

The Detroit Register Co., incorporated in Detroit for $15,000 in February, 1899, has filed articles of removal from Detroit to Milan; also articles of increase in capital stock to $50,000, of which $40,000 has been paid in.

The Double Friction Coil Clutch Co., Chicago, capitalized at $30,000, has been incorporated to manufacture tools and machinery. The incorporators are: Christian G. Magenheimer, H. Gustav Magenheimer, and Raymond W. Fairfoull.

The Chandler Planer Co., Ayer, Mass., has been incorporated with a capital of $300,000. The officers are: President, Andrew J. Woodward; treasurer, George J. Burns.

The Atlas Roofing Co., New York City, has been incorporated with a capital of $5,000. The incorporators and directors are: H. A. Daniel, Rondout; H. V. Carrere, New Brighton; R. E. Chamberlain, New York.

The Pollard-Berry Sheet Metal Works is the name of a new firm which has just been organized at Paducah, Ky. The new firm will do all kinds of tin, copper and galvanized work.

The Chemung Mfg. Co., Elmira, N. Y., has been incorporated with a capital of $5,000. The incorporators are: J. H. Van Tassel, J. M. Thornton and L. T. Manning, all of Elmira.

The Monarch Railway Supply Co., Detroit, Mich., has been organized with a capital of $50,000 to manufacture railway supplies. The stockholders are: Harry W. Frost, James Whittemore and Frederick H. Holt, all of Detroit.

The Marinette Gas Engine Co., Chicago Heights, Ill., recently increased its capital from $250,000 to $400,000. The additional capital will be used in increasing the output of the company and also in equipping the plant with additional modern tools as they may be required.

The Novelty Gray Iron Foundry Co., Dallas City, Tex., has been incorporated with a capital of $10,000. The incorporators are: Phil Schanz, Edgar P. Schanz and Harry A. Schanz.

The John J. Cody Co., Brooklyn, N. Y., has been incorporated with a capital of $10,000 to deal in iron work and materials. The directors are: John J. Cody, John J. Cody Jr., and James F. Cody, of Brooklyn.

Fires and Accidents:—

Fire Feb. 2 in the chart department of the Cramps Shipbuilding plant, Philadelphia, destroyed valuable blue prints, models and charts. Secretary Taylor of the company stated that the monetary loss will not amount to more than $6,000. Work on the battleships Idaho and Mississippi and the armored cruiser Tennessee, the plans for which were destroyed, will not be seriously impeded. Drawings for the revenue cutter Galveston, the Espanza, a Venezuelan Government vessel, and two Clyde Line steamers, all under construction, were burned, but the vessels are so far advanced that their construction will not be impeded.

Fire Feb. 5 destroyed the rolling mill situated on an island in James River, between Richmond and Manchester, doing damage estimated at $30,000. The property was recently acquired by Frank Gould, of New York.

New Construction:—

Work is so far advanced on the new plant of the United Shoe Machinery Co. at Beverly, Mass., that it is expected part of the equipment will be in readiness by March 1, and that by July 1 the entire plant will be in operation. The dimensions of the various buildings, which are constructed entirely of concrete, are as follows: Factories A and B—520 ft. long, 62 ft. wide, and four stories high; factory C—280 ft. long, 62 ft. wide, and four stories high; drop forge building—192 ft. long and 62 ft. wide; foundry E—222 ft. long and 106 ft. wide; the powerhouse—99 by 91 ft. Factories A and B are connected by two large wings, the factories B and C, and B and D are connected in the same way. In these wings are to be located the tool rooms, toilet, bath and locker rooms for each floor. The entire plant will be driven by electric motors in the group system comprising forty motors. Power is to be supplied by two turbine engines direct connected. Ninety per cent of the wall area is lighting space, which requires the use of 35,000 lights of glass. Arrangements have been made to provide homes for the company's employees at a minimum expense. It is anticipated that when the new buildings are in complete running order approximately 6,000 persons will be employed.

The work on No. 3 ore dock at Two Harbors, Minn., is progressing rapidly. All of the old structure has been torn down. Three cribs, 100 ft. in length, have been built and sunk. Another 140 ft. long is being constructed and will probably be finished in a few days. This will leave one large crib to be built, which will be sunk at the extreme end of the new extension. Those which have been built and the one now being constructed are 27 ft. in width and when sunk will form the foundation for the center of the dock, and also to add rigidity to the structure. They are being filled with broken rock, which makes practically a solid stone foundation. Piling to support that portion of the dock not resting on the cribs is being driven; the piles for about 150 ft. of the 500-ft. extension

having been driven during the past two weeks. A large amount of the timber for the new dock has arrived and consignments are being received regularly. The timber is being framed by machinery about as fast as received, so that as soon as the debris of the old dock is removed the work of rebuilding will be begun.

The Compania Fundidora de Fierro y Acero, of Monterey, Mexico, is now building coke ovens at the steel plant of the company in that city. The foundations for 60 ovens have been laid, and they will be in operation within four months. It is proposed to build 60 more ovens in the near future.

The Columbus Machine Works, Columbus, Ind., have lately made some extensive improvements and enlarged their plant, which now occupies a quarter square. Considerable new machinery has been installed.

The plans for the plant of the Southern Skein & Foundry Co., Chattanooga, Tenn., have been completed. The foundry building will be 75 x 200 ft., and the machine shop 75 x 125 ft. The buildings will have brick walls, steel roofing and will be fireproof throughout.

Additional funds have been secured for completing the plant of the Atlanta Tin Plate Co., Atlanta, Ind., and work is now being pushed as rapidly as weather conditions will permit with the expectation that it will be ready for operation within four months.

The Gibson-White Co., Chattanooga, Tenn., recently incorporated, will soon begin the erection of a foundry building.

Plans for the new shops of the Shawmut railroad, at Hornellsville, N. Y., have been completed. About $325,000 will be expended. The location of the shops has not yet been determined.

The Chattanooga Implement & Mfg. Co., Chattanooga, Tenn., will begin the erection of a new foundry as soon as the weather will permit. The floor space of the foundry will be 20,000 sq. ft. At present the plant of the company comprises both implement and foundry departments. When the new foundry is erected, the present plant will be used only for the manufacture of implements after the castings are made. The present capital of the company is $50,000, but application has been made for permission to increase it to $100,000.

The Chattanooga Iron & Wire Works, Chattanooga, Tenn., recently incorporated, is a reorganization of an old concern with a new management. The company makes ornamental and structural iron, steel and wire work, and also intends to take the agency for meritorious iron building specialties, such as joist hangers, metal lathes, steel rolling doors, etc. The company will probably have a building erected especially for its own use some time in the near future.

The Mannington Forged Tool Co., Mannington, W. Va., is building a plant 75 x 140 ft. and will manufacture edged tools. The company has bought out the plant formerly operated and owned by George F. Eggerdinger, who made the same line of tools and sold them to consumers direct. The Mannington company will sell to jobbers and dealers. The company will be in the market for all kinds of equipment from an emery grinder to a steam engine and boiler. E. E. Hauk, Box 618, Mannington, W. Va., is the purchasing agent.

The Chesapeake & Ohio railroad contemplates the erection of extensive locomotive and repair shops. The location has not been decided upon, and a number of cities, including Huntington, W. Va., and Richmond, Va., are hopeful that they will be selected as the site.

The Harlan & Hollingsworth Co., Wilmington, Del., will erect a new boiler shop 300 x 125 ft. and make other extensive improvements to its plant.

Work has been commenced at Birmingham, Ala., upon the erection of a plant for the Brantley Mfg. Co., which will make a patented alternating cotton gin steel brush.

Although flattering offers have been made by Erie, Pa., and other cities, the Otto Gas Engine Co. expects to erect its new plant at Wilmington, Del., on the tract which it purchased some time ago. It is expected the company will begin to build its works as soon as weather will permit.

General Industrial Notes :—

The University of Tennessee, Knoxville, Tenn., has purchased from the A. S. Cameron Steam Pump Works, foot of East Twenty-third street, New York City, through McClung & Co., agents at Knoxville, Tenn., a Cameron regular boiler feed pump, as a part of the laboratory equipment in the mechanical engineering department.

A force of 50 men is employed at the Helen blast furnace of the Red River Furnace Co., Clarksville, Tenn., making repairs for the purpose of starting the plant about March 1.

The plant of the American Bridge Co., Columbus, O., has been leased by the C. E. Morris Iron Works. The plant was originally erected by the Columbus Bridge Co., which later became the New Columbus Bridge Co., which was absorbed by the American Bridge Co. Through the acquisition of this plant the Morris Iron Works will be enabled to extend the business of the company quite materially. It will be confined to the manufacture of structural iron. The work of removing to the leased plant has already been begun.

The Northwestern Foundry & Supply Co., Detroit, Mich., has increased its capital from $50,000 to $100,000. The new issue consists of $60,000 common and $40,000 preferred, all fully paid. The company has just completed an addition to its foundry, 64 x 120 ft. The following officers have been elected for the ensuing year: H. D. Keller, president; Thos. E. Robinson, secretary and treasurer and John F. Shaening, vice president. Frank H. Keller has been added to the board of directors.

The Dayton Malleable Iron Works Co., Dayton, O., has increased its capital from $200,000 to $1,000,000. The company increased its capital to an amount that more nearly reflects the value of the business, but with no idea of material expansion other than that made possible by rearrangement.

The stock and machinery of the Scott Drive Well Point Co., Chicago, have been purchased by the Western Tube Co., Kewanee, Ill. The entire plant has been moved from Chicago to Kewanee, where the business of the combined companies will be conducted.

The new merchants' bar mill of the Lackawanna Steel Co., Buffalo, was placed in operation February 1. E. A. S. Clarke, president of the Lackawanna Steel Co., C. H. McCullough, assistant to the president, Vice President Reis, General Manager Sheldon, A. K. Hamilton, chief engineer, and W. E. Jewell, superintendent of the mill, witnessed the beginning of operations.

The Menominee Electric Mfg. Co., Menominee, Mich whose plant was recently destroyed by fire, has leased a plant at Marinette, Wis. The plans for the future have not been definitely decided.

The National Electric Co., Milwaukee, Wis., has begun the publication of "The National Electrical Catechism," in which will be presented in the form of answers to questions those principles and practices of electrical engineering which especially concern the users of electrical apparatus. No charge will be made for this publication, which will be issued as a serial and will be sent to any one sending a postal card giving his name and address. Starting with the first principles of electricity, the "Catechism" deals with the definitions of the electrical units, and it is intended eventually to lead up to a very interesting series of questions and answers.

A reduction in freight rates on pig iron from the Birmingham district to Atlanta, Ga., is announced. The old rate was $1.30 per gross ton, and the new rate, which went into effect February 1, is $1.15 per gross ton in car load lots.